Conductivity

Product Name	Part No.
Industrial Conductivity Cells	70-82-03-14
5000TC Torodial Conductivity Cells	70-82-03-37
Transmitter-APT2000 Contacting Conductivity	70-82-03-33
Transmitter-APT2000 Toroidal Conductivity	70-82-03-35
DirectLine Contacting Conductivity Transmitter	70-82-03-47
DirectLine Contacting Conductivity Cells	70-82-03-58
Analyzer - APT4000 Toroidal Conductivity	70-82-03-42
Analyzer - APT4000 Contacting Conductivity Analyzer	70-82-03-45
Analyzer - UDA2182 Multiple Input	70-82-03-54

Product Summary

Conductivity

Proven technology for reliable measurements

Honeywell offers a wide variety of conductivity cells, analyzers/controllers and transmitters to satisfy your process needs, from sensitive ultra-pure water applications to highly conductive industrial processes. Our cells are constructed of rugged materials, guaranteeing longer life. All conductivity cells have integral temperature compensators that are compatible with Honeywell instrumentation.

Industrial Conductivity Cells
Superior performance for all-purpose applications. Constructed of PES for high corrosion resistance. Designed for continuous, reliable measurements at temperatures up to 140°C and pressures up to 250 psig.

5000TC Torodial Conductivity Cells
Toroidal (electrode-less) conductivity sensor measures the conductivity of solutions from 0.2 to 2000 millisiemens/cm. The sensor can also be used for monitoring chemical concentration and salinity.

APT2000 Contacting Conductivity Transmitter
Two-wire, 24-volt transmitter that continuously measures conductivity, resistivity and salinity within the power, chemical, pharmaceutical, pulp & paper, and water quality industries. Continuously monitors sensor and transmitter electronics and immediately displays diagnostic information at the onset of a problem.

APT2000 Toroidal Conductivity Transmitter
Honeywell toroidal conductivity cells or electrically compatible sensors can be used with the APT2000 transmitter. Features a large front display for quick recognition of process parameters and diagnostics even at a distance.

DirectLine DL423 Contacting Conductivity Transmitter
Released by Honeywell as part of a new generation of analytical measurement instruments. This device's unique architecture combines the latest in microelectronics technology with the proven performance of a Honeywell conductivity cell — providing unequaled savings during installation, start-up, operation and maintenance.

DirectLine Contacting Conductivity Cells
Intended for use with the Honeywell DL423 DirectLine Conductivity Module. The sensor's durable epoxy body construction is ideal for light industrial applications.

Analyzer - APT4000 Toroidal Conductivity
Continuously measures conductivity, chemical concentration and salinity in industrial processes within the chemical, food & dairy, pulp & paper, refinery, metals and other industries.

Analyzer - APT4000 Contacting Conductivity Analyzer
The Honeywell Analytical Process Analyzer (APT) 4000 Series2 continuously measures conductivity, resistivity and salinity in industrial processes within the power, chemical, pharmaceutical, pulp and paper, and water quality industries.

Analyzer - UDA2182 Multiple Input
The latest advancement in analyzer technology. This is the most versatile multiple input analyzer package on the market for measurement of pH, ORP, conductivity and dissolved oxygen.

Honeywell

Industrial Electrolytic Conductivity Cells Series UDA2182 and APT Specifications

70-82-03-14 July 2009

Main Overview

The specification of an Electrolytic Conductivity Cell requires careful consideration of the following factors:

1. Appropriate Cell Constant, determined by the analyzer or recorder used. See instrument range table.
2. Chemical resistance.
3. Physical nature of mounting; insertion, immersion, flow through, insertion/removal and laboratory type.
4. Temperature/pressure rating required.
5. Integral automatic temperature compensator. Determined by the analyzer or recorder used.

Appropriate Cell Constant - Reference Information

The choice of cell constant is determined by the measuring instrument and its range.

Cell constant - The cell constant describes the cell's geometry. It is the length between electrodes divided by the effective sample area between them. The standard 1 cm^{-1} constant cell can be visualized as 2 plates of 1 cm^2 area spaced 1 cm apart. Other cell constants have different length/area ratios.

Applying the cell constant to the measured resistance/conductance converts it to resistivity/conductivity - a property of the fluid independent of the measuring apparatus and sample size.

Proper cell constant - A variety of cell constants is needed to measure the complete range of electrolytic solutions from less than 1. 0 ohms-cm to greater than 18 megohms-cm.

For accuracy, the measured resistance must be at a level that will give the best sensitivity for the measuring circuit. At very low measured resistance, polarization effects and leadwire resistance could affect accuracy.

Output Torque/Full Travel Stroking time is avoided by choosing a cell constant which will raise the measured resistance to an acceptable level. At very high resistance values, leadwire capacitance can affect the accuracy. This is avoided by selecting a cell that will lower the measured resistance to an acceptable level.

To measure high purity water, a low cell constant is specified which lowers the measured resistance. Conversely, sulfuric acid may have a specific resistance of 1.0 ohm-cm; therefore, a 50 constant cell should be used to raise the measured resistance to 50 ohms.

Selection Guide for Conductivity Cells

4973 Type Should be quoted whenever possible for constants 0.01 to 10 cm^{-1}.

When measuring deionized water where the cell has the potential of being exposed to regeneration acids and bases, the 4973 cell with its titanium electrodes and rapid temperature response are preferred.

If a 4905 cell is used, the platinum electrodes are best, but the nickel (except for Monel electrodes for the 0.1 constant) electrodes are suitable and should be bid in a competitive situation.

4905 Type Widest choice of cell constant - should be quoted on all applications where 4973 is not applicable and for replacements.

4909 Type Should be quoted when cell removal is required without disturbing the process.

Mounting Configurations

Proper mounting of a cell is as important as any other parameter. A cell improperly installed may not give an accurate indication of the true process conditions. Careful consideration should be given to the mounting.

Insertion Cell can be mounted directly in process stream. Location should be in rapid fluid motion and in a position that will prevent sediment accumulation. Also suitable for lab use.

Immersion Cell can be mounted over a tank or open trough. The cell should be completely immersed to avoid a false indication of high resistivity (low conductivity) or incomplete temperature compensator immersion. Cells used in this type of installation should utilize a support pipe of sufficient length to achieve desired immersion depth. Model 4905 cells are recommended for immersion mountings.

Flow Cell assembly can be placed directly in process fluid line or bypass sample line. The cell should be completely immersed and positioned to prevent accumulation of sediment to avoid false indication of high resistivity (low conductivity).

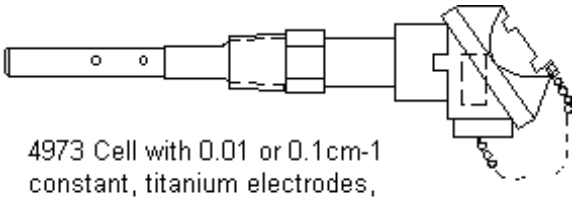
Insertion/Removal cell can be removed at pressures 50 psi or less without disturbing the process.

Automatic Upload of Cell Constant and Cell factor
Conductivity cells have an embedded EEProm that contains the cell constant and cell factor information. When connected to the UDA2182 Dual Input Analyzer the information is automatically uploaded into the unit. There is no need to manually input the data.

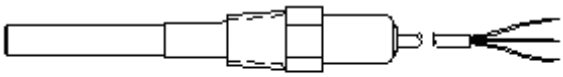
4973 and 4974 Type Overview

These cells are ruggedly constructed for reliable, continuous measurement of electrolytic conductivity in industrial water processes at temperatures up to 140°C and pressures up to 250 psig.

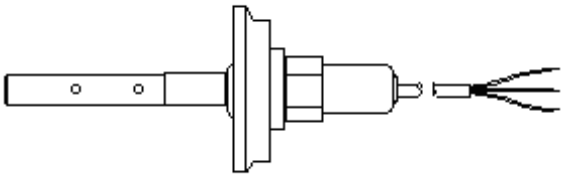
The cells feature polyethersulfone (PES) construction for high-corrosion resistance, with electrodes of titanium (for 0.01 and 0.1 cell constants) and high-density graphite (for 1.0 and 10.0 cell constants).



4973 Cell with 0.01 or 0.1cm-1 constant, titanium electrodes, and aluminium junction head.



4973 Cell with 0.01 or 0.1cm-1 constant, graphic electrodes, and Teflon guard.



4974 Cell with 1 1/2" sanitary CIP fitting

For *insertion* applications, the 3/4” NPT male thread permits permanent installation in a pipe or tank; the cell can also be used as a laboratory dip-type for batch sampling.

For *flow* applications, the cell can be installed directly into a process stream, or used with a separately ordered 3/4” pipe tee in a by-pass stream. The cells have been designed to keep the electrodes and the temperature compensator immersed in the stream flow, ensuring that the cell will respond quickly and accurately to changes in both solution concentration and temperature.

For *sanitary clean-in-place (CIP)* piping systems, the 4974 cells include standard 1 1/2” or 2” CIP fittings suitable for food and beverage, pharmaceutical and cosmetic, or biotechnology industries.

Connections

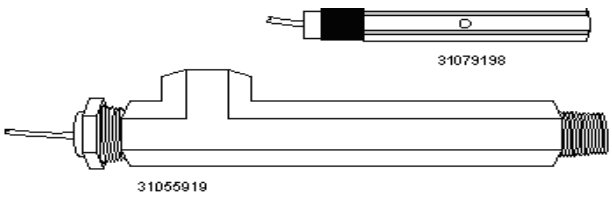
Integral cable: The 4973 and 4974 cells offer this option that provides a cell with a potted cable. The cable and cell are one entity and cannot be separated. Model 4973 and 4974 cells are not designed for immersion mounting installations.

Quick disconnect cable: Only the 4973 offers this option that provides a cell with a potted receptacle. The cable mates with this receptacle. The cell and cable are separate entities.

Specifications

4973/4974 Type	
Automatic Temperature Compensator	Supplied on all cells
Cell Constant	**4973/4974**: 0.01, 0.1, 1.0, and 10 cm^{-1}
Maximum Temperature Limit	**4973**: 140°C (284°F) at rated pressure **4974**: 130°C (266°F) at rated pressure, may be further limited by CIP gasket and clamp type
Maximum Pressure Limit	**4973**: 1724 kPa (250 psig) at rated temperature **4974**: 1034 kPa (150 psig) at rated temperature, may be further limited by gasket and clamp type
Insertion	**4973** cells: 3/4" NPT male thread for schedule 40 and 80 pipe **4974** cells: 1 1/2" or 2" sanitary CIP fitting
Insertion Depth	89 mm (3 1/2") for 1, 10, and 0.01 constants from solution end of 3/4" NPT male thread 64 mm (2 1/2") for 0.1 constant
Wetted Parts	Cell body: PES (polyethersulfone) Electrodes: 0.01 and 0.1 constant, titanium; 1.0 and 10.0 constant, high-density graphite with Teflon guard. 4974 series also includes food grade silicone rubber and polished 316 S.S.
Lead wire	**4973/4974**: Integral PVC-covered, shielded, 22-gage cable. If more than 50' is required, specify the junction box head and the required length of extension cable (head has 3/4" female NPT with 1/2" female adapter bushing) conduit connection). For a separate junction box, specify part number 31316260, and appropriate length of cable.
Electrical Connections	**4973**:Integral cable – 6 leads with integral Automatic Temperature Compensator Quick disconnect option – mating head with cable must be purchased from Honeywell. **4974**: Integral cable – 6 leads with integral Automatic Temperature Compensator
Weight	**4973:** 0.2 kg (0.5 lb.) **4974**: 0.4 kg (1 lb.)
Approvals	**4973**: Manufactured to comply with ASME boiler and pressure vessel code Section VIII, Div. 1, UG-101. CRN #0F11607-5C

Flow Chambers for 4973



Flow Chambers (ordered separately) used with 4973 Cell for Sample Stream Measurements

055919	Max. Flow: 5 gpm at 40 psig Material: PES Max. Pressure: 200 psig at 25°C Max. Temperature: 140°C at 5 psig Dimensions: 38 mm x 222 mm (1 1/2" x 8 1/4") Sample Inlet: ¾" NPTM Sample Outlet: ¾" NPTF

4973/4974 Type	
	Cell Port: ¾” NPTF
31079198	Max. Flow: 750 cc/min. Material: 316 stainless steel Max. Pressure: 200 psig (1378 kPa) Max. Temperature: 140°C Dimensions: 38 mm (1 1/2”) dia. X 114 mm (4 1/2”) Sample Inlet: 1/8” NPTF Sample Outlet: 1/8” NPTF Cell Port: ¾” NPTF

4905 Type Cells Overview

Constructed of PES and Ryton for high corrosion resistance, 4905 Series cells can be supplied with nickel, platinum or Monel (depending on cell constant) electrodes, and will provide continuous reliable measurements at temperatures up to 140°C at pressures up to 250 psi.

For insertion applications, the 1” NPT male thread permits installation in a pipe or tank, for flow applications, the cell can be installed directly into a process stream, or used with a separately ordered 276127 Flow Chamber in a bypass stream.

For immersion applications, ½” rigid or flexible plastic pipe can be added to the top of the cell: up to 19’ (5.8m) for the 20’ cable; up to 49’ for the 50’ cable. When used in immersion applications, temperature must not exceed 85°C.

Connections

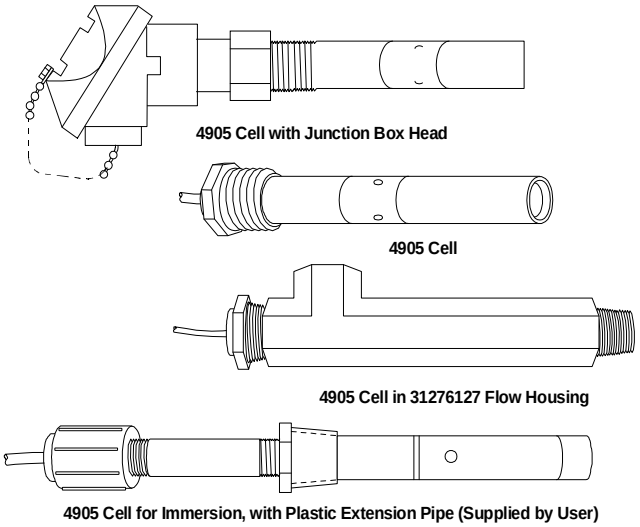
Integral cable: The 4905 cell offers this options that provides a cell with a potted cable. The cable and cell are one entity and cannot be separated. This configuration can be used in all applications.

Quick disconnect cable: The 4905 also offers this option that provides a cell with a potted receptacle. The cable mates with this receptacle and must be purchased from Honeywell. The cell and cable are separate entities. This configuration cannot be used in immersion applications.

Specifications

4905 Series Cell For high corrosion resistance, the 4905-Series Cells can be supplied with either nickel, platinum, or monel electrodes.	
Application	
Insertion	The 1” NPT male thread permits installation in a pipe or tank; the cell can also be used as a laboratory dip-type for batch sampling.
Immersion	1/2” rigid or flexible plastic pipe can be added to the top of the cell. Temperatures must not exceed 85°C. Up to 5.8 m (19’) for the 20’ cable, up to 49’ for the 50’ cable.
Flow	The cell can be installed directly into a process stream, or used with a separately ordered 276127 Flow Chamber in a bypass stream.
Flow Velocity	Maximum 10 ft./sec (3.0 m/sec)
Specifications	
Approvals	Manufactured to comply with ASME boiler and pressure vessel code Section VIII, Div. 1, UG-101. CRN #0F11607-5C
Cell Constants	**4905 Model**: 0.01, 0.1, 1.0, 10, and 50 cm^{-1}
Electrode Material	Nickel, Monel or platinum, as specified. Constants 10 and higher are platinized.
Leadwire	**4905**: PVC-covered 22- gage shielded cable 20’ or 50’ long, as specified. If more than 50’ is required, select either the cast aluminum junction box head option or select the 50’ option and the separate 31316260 cast iron junction box and additional length of leadwire as necessary.
Electrical Connections	6 leads with integral Automatic Temperature Compensator. Integral cable – 6 leads with integral Automatic Temperature Compensator Quick disconnect option – mating head with cable must be purchased from Honeywell. This option cannot be used in immersion applications.
Pressure	250 psig @ 140°C (284°F) maximum
Temperature	140°C (284°F) maximum continuous (the temperature limit for the A.T.C. accuracy may be lower than the cell’s material-of-construction temp. limit).
Mounting	1” NPT male
Insertion Depth	114 mm to 175 mm (4.5” to 6.9”) depending on cell constant; 112 mm or 224 mm (4.4” or 8.8”) additional depth available on special order.
Wetted Materials	Cell: polyethersulfone/Ryton Electrodes: Nickel, Platinum, or Monel (as specified)
Weight	Approximately 0.45 kg (1 lb.)

Specifications



276127 Flow Chamber	
Pressure	200 psig maximum @ 25°C (77°F)
Temperature	140°C (284°F) maximum @ atmospheric pressure
Flow	2 gpm @ 40 psig and atmospheric discharge
Dimensions	38 mm (1 ½") octagon x 222mm (8 ¾") long Sample Inlet: ¾" NPTM Sample Outlet: ¾" NPTF Cell Port: 1.0" NPTF

4909 Type Cells Overview

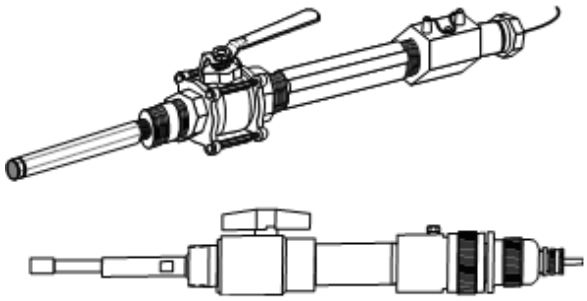
4909 Cell Assemblies, available in 316 Stainless Steel or CPVC Plastic, allow insertion or removal of the cell without interruption to the process.

Two safety features, a restraining mechanism and an internal safety stop, provide protection to an operator for safe cell removal at pressures up to 50 psig with caution.

The plastic removal device is equipped with a purge port to flush out any accumulated debris to aid in easy insertion or removal of the cell. The replacement cell for a 4909 assembly is a 4908.

4909 Series Cell	
Specifications (General)	
Cell Constants	0.01, 0.1, 1.0, 10, and 50 cm^{-1}
Electrode Material	Nickel, Monel or platinum, as specified. Constants 10 and higher are platinized.
Flow Velocity	Maximum 5 ft./sec (1.5 m/sec)
Leadwire	**4909**: PVC-covered 22-gage shielded cable 20' long, as specified. If more than 20' is required, use universal head cast aluminum (head has 3/4" female NPT with 1/2" female adapter bushing) junction box and appropriate length of cable. Universal heads contain female conduit connection and terminals to accommodate cell and automatic

	temperature compensator connection.
Electrical Connections	6 leads with integral Automatic Temperature Compensator and EEPROM.



Top: 4909 SS Insertion/Removal Cell Assembly
Bottom: 4909 CPVC Plastic Insertion/Removal Cell Assembly

Specifications for 4909 316 SS Assembly	
Approvals	Manufactured to comply with ASME boiler and pressure vessel code Section VIII, Div. 1, UG-101. CRN #0F11607-5C
Pressure	1379 kPa (200 psig) maximum at 140°C (284°F). Maximum pressure for removal or insertion is 50 psig. For CRN approval: 80psig @ 140°C (284°F)
Temperature	140°C (284°F) at 200 psig
Process Connection	1 1/4” NPT male
Insertion Depth	Varies between 165 mm and 224 mm (6.5” and 8.8”) from end of nipple, depending on cell constant.
Overall Length	From process connection: 422 mm (16.6”); 521 mm (20.5”) with junction head option
Total Length Required for Cell Removal	1130 mm (44.5”); 1238 mm (50.5”) with junction head option.
Wetted Materials	316 SS ball valve; Viton & Teflon internal sealing materials; PES cell; nickel, platinum, or monel electrodes, as specified.
Weight	4.5kg (10 lbs.)
Specifications for 4909 CPVC Plastic Assembly	
Pressure and Temperature	862 kPa (125 psig) maximum @ -5°C (23°F) 621 kPa (90 psig) maximum @ 50°C (122°F) 345 kPa (50 psig) maximum @ 80°C (176°F)
Process Connection	1 1/2” NPT male
Purge Port Connection	1/4” NPT female. Purge fluid temperature and pressure not to exceed 4909 CPVC temperature and pressure specifications.
Insertion Depth	Varies between 114 mm and 173 mm (4.5” and 6.8”) depending on cell constant. For 152 mm (6”) additional depth, specify 074344 tube separately.
Overall Length	From process connection: 502 mm (19.7”); 564 mm (22.2”) with junction head option.
Total Length Required for Cell Removal	914 mm (36”); 1067 mm (42”) if 074344 tube is used.
Wetted Materials	CPVC ball valve, Viton, Teflon & EPDM internal sealing materials, PES cell, nickel, platinum, or monel electrodes, as specified.
Weight	1.6 kg (3.5 lb.)

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information.

If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose**.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

For More Information

Learn more about how Honeywell's Industrial Electrolytic Conductivity cells are the most reliable in conductivity measurements, visit our website www.honeywell.com/ps/hfs or contact your Honeywell account manager.

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70-82-03-14
July 2009

Honeywell

Toroidal (Electrodeless) Conductivity Sensors Series 5000TC Specifications

70-82-03-37 June 2000

Overview

The Honeywell 5000TC toroidal (electrodeless) conductivity sensor measures the conductivity of solutions from 0.2 to 2000 millisiemens/cm. The sensors can be used for monitoring chemical concentration and salinity as well. The corrosion and fouling-resistant cells are available with a variety of mounting assemblies to ensure compatibility for applications in the chemical, food & dairy, refinery, pulp & paper, metal finishing and wastewater industries.

Features

- Variety of material types to meet most application needs – PEEK, PFA Teflon®, PVDF, and Polypropylene.
- Increased cell reliability due to high chemical resistance and low friction factor in the materials of construction
- Flexibility of installations with four mounting types – Immersion, Union-mount, Insertion/Removal, and Sanitary
- Temperature-compensated measurement with Pt 1000 ohm RTD
- Convenient for most applications – 20 ft. cable standard
- 3A-approved materials of construction and clean-in-place fitting make the sanitary type cells suitable for most sanitary applications.

Description

The Honeywell 5000TC sensors are specifically designed for the monitoring of conductivity, chemical concentration, or salinity in difficult applications where coating, fouling, corrosion, or high temperatures/ pressures are a concern. The sensor's 1 ½" diameter bore minimizes rough surfaces to ensure that flow impedance is minimized. A 1000Ω Pt RTD provides accurate temperature measurement to ensure proper temperature compensation. Two types of basic sensor forms are available with the Honeywell 5000TC – the convertible style or sanitary style

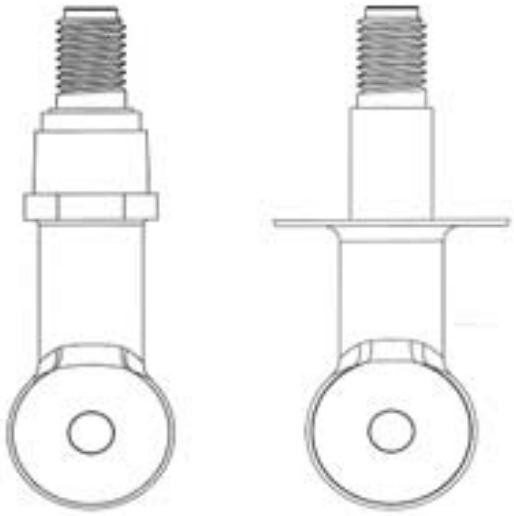


Figure 1 - 5000TC Convertible & Sanitary Sensors

Convertible Style

The 5000TC convertible style toroidal sensor includes both a ¾" and a ½" fitting to allow direct fastening to the end of a pipe for either immersion mounting or a union-mount adapter for a standard 2" pipe tee. The convertible style can also be insertion mounted into a 2" ball valve assembly. Convertible sensors are available in PEEK, PVDF, PFA Teflon, and Polypropylene materials.

Sanitary Style

The 5000TC sanitary style toroidal sensor includes a clean-in-place style fitting and is constructed of 3A-approved materials. It has an integral 2" sanitary-mount flange which mates to Honeywell sanitary tee mounting hardware. The sanitary-style sensor includes a special cap and EPDM compound gasket. The gasket is also available separately for mounting to a 2" sanitary clamp-type ferrule or butt-weld tee. Sanitary sensors are available in PVDF, PFA Teflon, and Polypropylene materials.

Dimensions for 5000TC Sensors

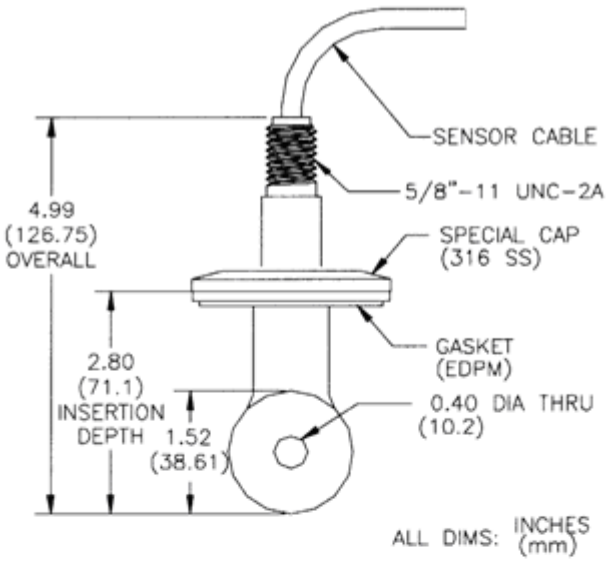


Figure. 2. Dimensions for Sanitary Type

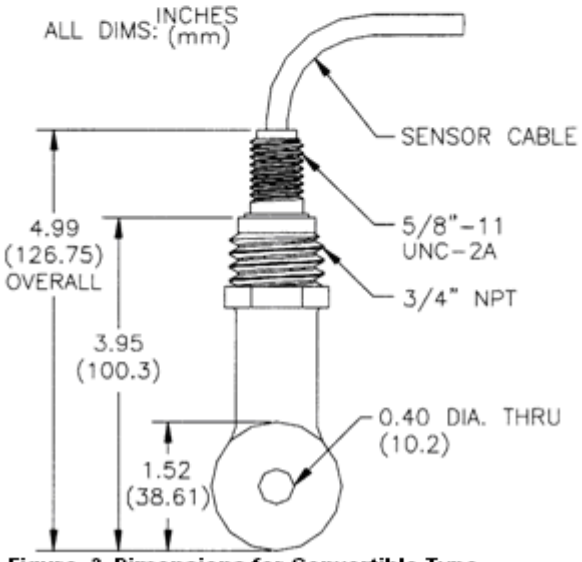


Figure. 3. Dimensions for Convertible Type

Wetted Materials
To simplify chemical resistance problems, these sensors are constructed so that only one material is wetted by the process. The wetted material is non-conductive to insure that the sensor is electrically isolated from the process fluid. The 5000TC sensors are available in four different material types – PEEK, PFA Teflon, Polypropylene and PVDF.

PEEK (Polyetheretherketone)	This material type is ideal for the broadest range of applications within the chemical, pulp & paper, and refinery industries. The only known materials to severely attack PEEK are very high concentrations of acids, such as nitric or sulfuric. It has a higher temperature capability than the Polypropylene or PVDF sensors.
PFA Teflon (Perfluoroalkoxy Teflon)	This material type is ideal for extremely corrosive applications, especially high concentrations of sodium hydroxide, nitric acid, sulfuric acid, or hydrofluoric acid. It has the highest temperature rating of the four sensor types. It is also ideal for applications which have a tendency to coat the sensor.
Polypropylene	This material type is ideal for wastewater applications where the temperatures and pressures are close to ambient and chemical compatibility is not a serious concern.
PVDF (PolyVinylidene Fluoride, also called "KYNAR®")	This material type is one of the most rigid and abrasion-resistant materials. It has good chemical resistance to halogens, such as chlorine or bromine. It is ideal for applications which require higher pressure ratings, but do not have high temperatures, such as water treatment applications in the semiconductor industry.

Specifications Common to All Cell Types

Wetted Materials	PFA Teflon, Polypropylene, PVDF, or PEEK	
Operating Temperature Range	10 °C to 125 °C (14 °F to 257 °F)	
Maximum Flow Rate	10 ft. (3 m) per second	
Measuring Range	0.2 to 2000 milliSiemens/cm	
Temperature Compensator	Pt 1000 Ω RTD	
Sensor Cable	5 conductor (plus two isolated shields) cable with XLPE (cross-linked polyethylene) jacket; rated to 150 °C (302 °F); 20 ft. (6 m) long	
Bore Size	1.5" diameter, 0.4" hole	
Pressure/Temperature Limits:		
Sensor Only (no hardware)	Polypropylene	100 psi at 212 °F (6.9 bar at 100 °C)
	PVDF	100 psi at 248 °F (6.9 bar at 120 °C)
	PEEK	200 psi at 302 °F (13.8 bar at 150 °C)
	PFA Teflon	200 psi at 302 °F (13.8 bar at 150 °C)

Mounting Types

The 5000TC sensors are available with a number of different mounting types. These include immersion mounting (CPVC or PVDF materials, also PVC junction box), union mounting (316 SS, CPVC or PVDF materials with optional 2” tee), sanitary mounting (316 SS 2” tee with heavy-duty clamp), or insertion/removal mounting (316 SS or CPVC material).

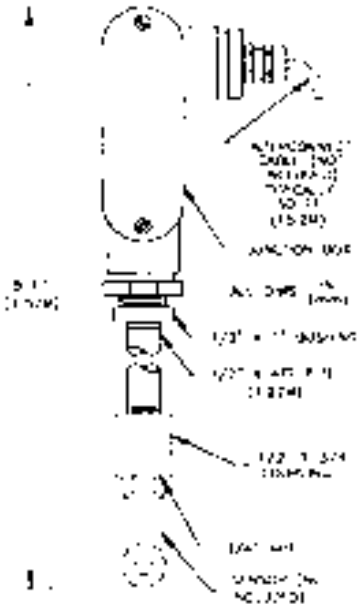


Figure 4 Immersion Mounting

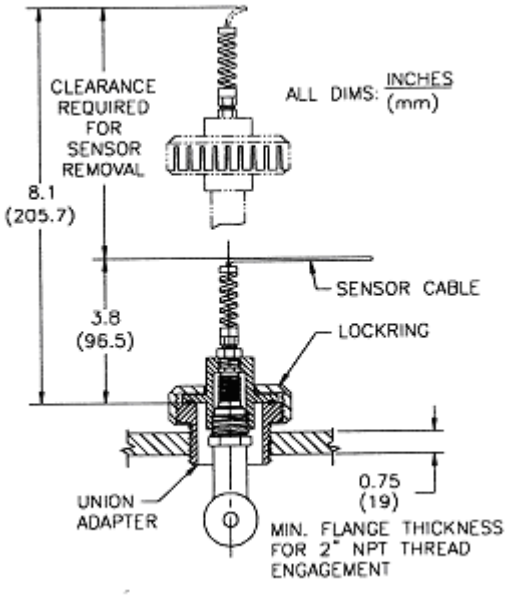


Figure 5 Union Adapter Mounting

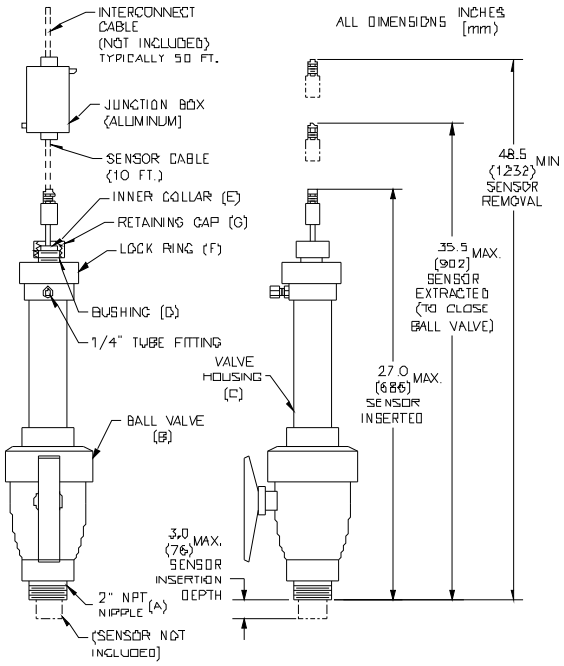


Figure 6 Insertion/Removal Mounting

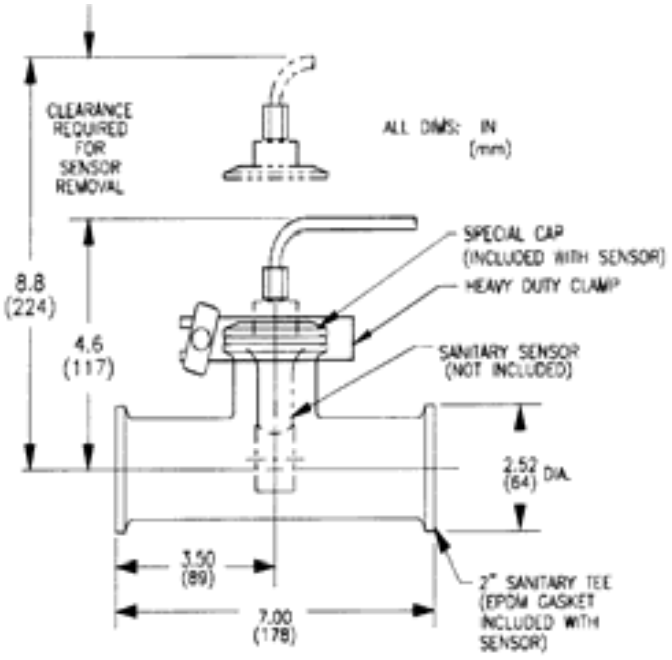
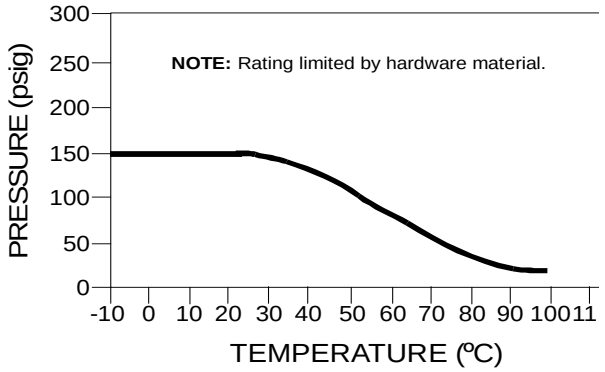


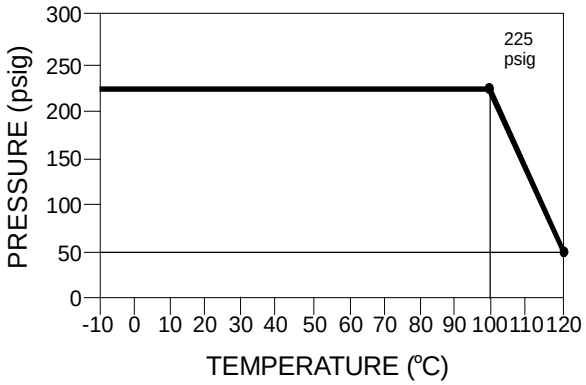
Figure 7 Sanitary Mounting

Basic Mounting Specifications*

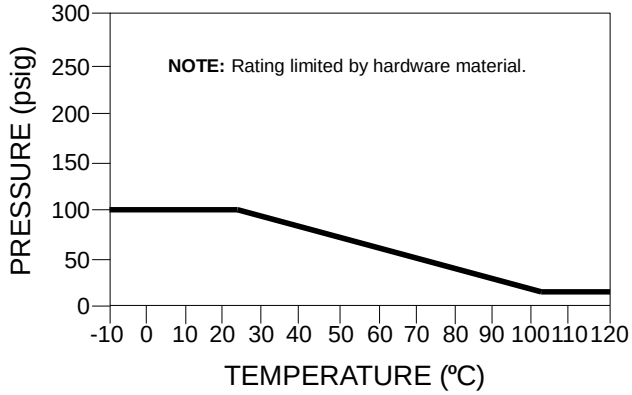
CPVC Mounting Hardware
(all Sensor Materials)



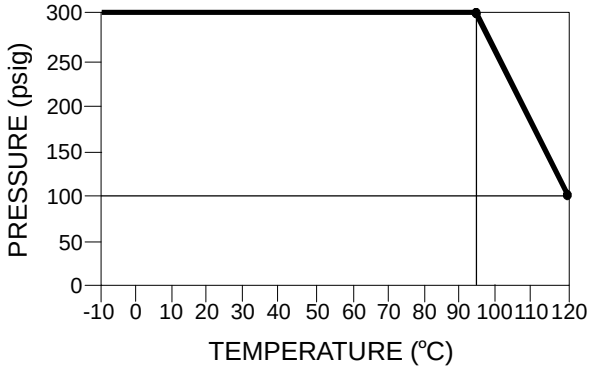
316 Stainless Steel Sanitary Mounting Hardware
With Polypropylene Sensor



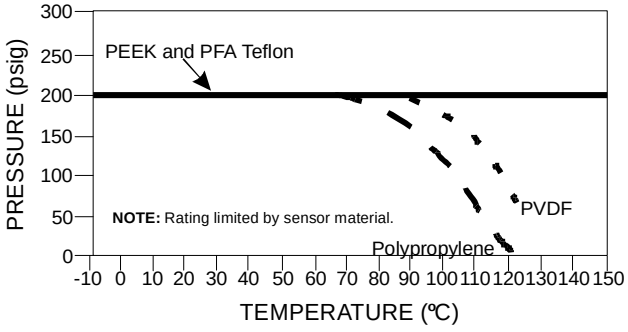
PVDF Mounting Hardware
(all Sensor Materials)



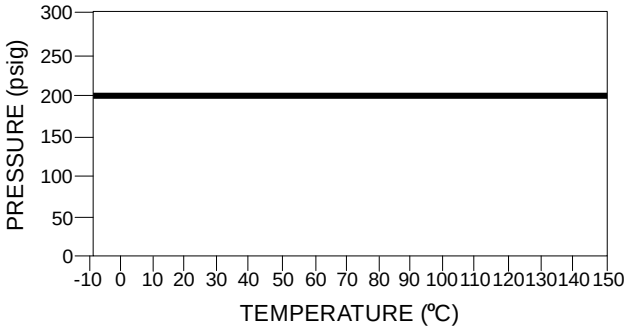
316 Stainless Steel Sanitary Mounting Hardware
With PVDF Sensor



316 Stainless Steel Mounting Hardware



316 Stainless Steel Sanitary Mounting Hardware
With PFA Teflon Sensor



*Ratings for the above Honeywell sensor and mounting hardware combinations are based upon water service. More severe service may require a correction factor. Includes immersion mount, union adapter mount, and sanitary mount. Separate specifications are provided for the insertion/removal device.

**Sanitary mounting hardware ratings are for 51451248-001 hardware using the 51451257-001 heavy duty sanitary clamp. Other hardware and clamp combinations may reduce the listed ratings.

Insertion/Removal Mounting Specifications*

Wetted Materials	Plastic Hardware: Brass, CPVC, Teflon Valve Seats, Viton O-ring Seals Stainless Steel Hardware: 316 Stainless Steel, Teflon Valve Seats, Viton O-ring Seals
Temperature Limits	Plastic Hardware: 23 to 176°F (-5 to 80°C) unsupported if installed vertically; 23 °F to 203 °F (-5 °C to 95 °C) when supported with a bracket** Stainless Steel Hardware: 23 °F to 203 °F (-5 °C to 95 °C) supported or unsupported
Pressure Limits	Plastic Hardware: 50 psi @ 90 °C Stainless Steel Hardware: 100 psi @ 90 °C
Net Hardware Weight	Plastic Hardware: 7.5 lbs. (3.4 kg) Stainless Steel Hardware: 25 lbs. (11.3 kg)

*These sensor/mounting hardware assembly temperature ratings are limited by the hardware material, maximum pressure, and whether the assembly is supported or unsupported.

**The CPVC insertion/removal assembly must be supported with a bracket or strap if it is not installed vertically

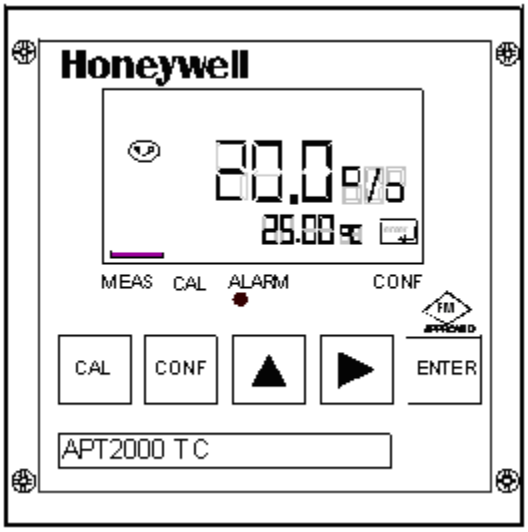


Figure 8 - Honeywell APT2000TC Torodial Conductivity Transmitter

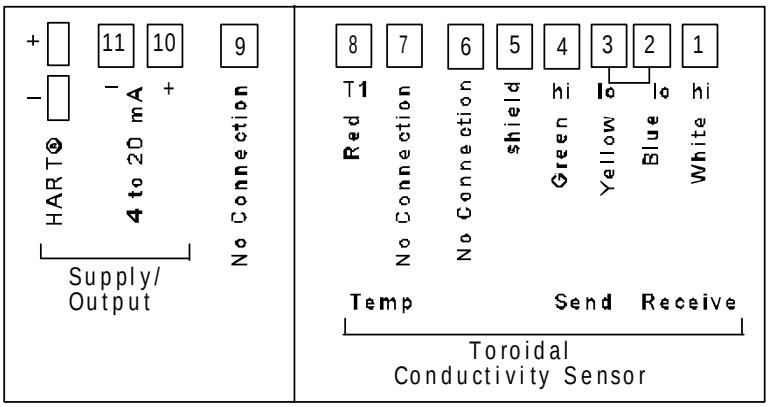


Figure - 9 5000TC Wiring Diagram for APT2000TC Transmitter

Toroidal Conductivity Cells Model Selection Guide

51- 52-16 – 54

Issue 1

Instructions

- Make one selection from Table I through IV
- A dot (•) denotes unrestricted availability.

Key Number **I** **II** **III**

_ _ _ _ _ _ - _ _ - _ - _ _ _

KEY NUMBER **Selection Availability**

Description		
Toroidal (Electrodeless) Conductivity Probe	5000TC	↓

TABLE I

Mounting Material Type	No Mounting Assembly		00	•
	CPVC Pipe, PVC Junction Box	51451240-001	11	•
	PVDF Pipe, PVC Junction Box	51451241-001	12	•
	316 SS Union Adapter & Standard 2" Tee	51451242-001	21	•
	316 SS Union Adapter Only	51451243-001	22	•
	CPVC Union Adapter & Standard 2" Tee	51451244-001	23	•
	CPVC Union Adapter Only	51451245-001	24	•
	PVDF Union Adapter & Standard 2" Tee	51451246-001	25	•
	PVDF Union Adapter Only	51451247-001	26	•
	316 SS Sanitary 2" Tee & Heavy-Duty Clamp	51451248-001	31	•
	316 SS Insertion/Removal Device	51451249-001	41	•
	CPVC Insertion/Removal Device	51451250-001	42	•

TABLE II

Sensor Material Type	No Sensor		0	•
	Convertible Polypropylene Sensor	51451251-001	1	**a**
	Convertible PVDF Sensor	51451252-001	2	**a**
	Convertible PEEK Sensor	51451253-001	3	**a**
	Convertible PFA Teflon Sensor	51451254-001	4	**a**
	Sanitary Polypropylene Sensor	51500150-001	5	**b**
	Sanitary PVDF Sensor	51500151-001	6	**b**
	Sanitary PFA Teflon Sensor	51500152-001	7	**b**

TABLE III

Future	None	000	•

ACCESSORIES

51451255-001		6-Conductor Interconnect Cable
51451256-001		6-Conductor Junction Box (comes standard with immersion hardware)
51451257-001		Spare Sanitary Clamp (standard with option 31 from Table I)
51451258-001		Spare Special Cap (standard with option 31 from Table I)
51451259-001		Spare Sanitary Gasket (standard with option 31 from Table I)

RESTRICTIONS

Restriction Letter	Available Only With		Not Available With	
	Table	Selection	Table	Selection
a			**I**	**31**
b	**I**	**31**		

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and **is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.** Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

For More Information

Learn more about how Honeywell's Toroidal (Electrodeless) Conductivity Sensors can satisfy your process needs, from sensitive ultra-pure water applications to highly conductive industrial processes visit our website www.honeywell.com/ps/hfs or contact your Honeywell account manager.

Honeywell Process Solutions
1860 West Rose Garden Lane
Phoenix, Arizona 85027
Tel: 1-800-423-9883 or 1-800-343-0228
www.honeywell.com/ps

70-82-03-37
June 2000

2-Wire Contacting Conductivity Transmitters Series APT2000 Specifications

70-82-03-33, March 2001

Overview

The Honeywell Analytical Process Transmitter (APT) 2000 Series transmitter is a two-wire 24-Volt device that continuously measures conductivity, resistivity and salinity in industrial processes within the power, chemical, pharmaceutical, pulp and paper, and water quality industries. The APT2000's NEMA 4x and IP65 rated enclosure is specifically designed to meet the measurement needs of intrinsically safe, non-incendive and general-purpose areas. Honeywell conductivity cells or electrically compatible sensors can be used with the transmitter. For bi-directional remote monitoring/control of the process, the HART communications protocol is available as an option.

Description

The Honeywell APT2000 series of transmitters offer the widest available selection of advanced features in a reliable and economical instrument.

Reliability First

The advanced features of the APT2000 transmitter guarantee complete reliability. The APT2000 continuously monitors sensor and transmitter electronics and immediately displays diagnostic information at the onset of a problem. If an error or diagnostic is found, the transmitter will indicate the appropriate error code or pictograph (see Figure 2), blink a red LED and adjust the error current to 22 mA if desired. A manual loop-back check is available to test the integrity of the 4-20 mA output.

Foolproof Calibrations

Each Honeywell conductivity cell comes supplied with one of four sensor factors (0.01, 0.1, 1.0, and 10). The lower cell constants are used for low conductivity water or resistivity measurements, while the higher ones are used for higher conductivity water or salinity measurements. Calibration of the cells is easy by either utilizing a factory-determined calibration factor or performing a simple one-point calibration.

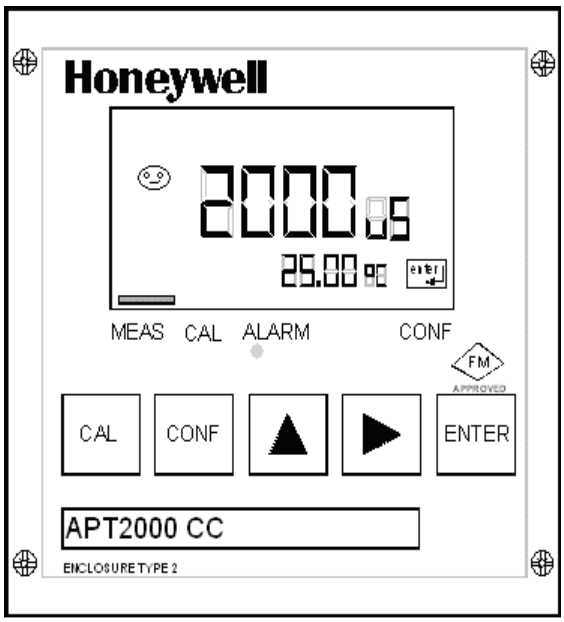


Figure 1 – APT2000 Transmitter

Quick Problem Assessment

The APT2000 has a large front display for quick recognition of process parameters and diagnostics even at a distance. Only the APT2000 employs *visual feedback* to quicken setup and maintenance times and to minimize errors made during calibrations.

Visual feedback refers to pictograph type characters that appear on the display both to prompt and respond to operator and process changes.

Pictograph type characters also appear during problem conditions to report diagnostics for easy trouble-shooting. There is even a Sensoface® pictograph that provides constant feedback to the operator on whether or not there is a problem with the cell. These easily learned and recognized symbols make the APT2000 an easy-to-use instrument in any language.

Works with a Variety of Cells

Inputs to the APT2000 Series include all Honeywell conductivity cell types with appropriate temperature compensator and cell constant. These include the 4973 pure water cells, 4974 sanitary cells, 4905 general-purpose cells, and the 4909 insertion/removal cells.
In addition, a wide variety of other manufacturers' conductivity cells are compatible.

Fully Certified

Area certifications for the APT2000 include both intrinsically safe and non-incendive ratings from CENELEC. Each transmitter comes standard with CE.

Easily Integrated

The APT2000 Series transmitters can be continuously remote controlled via HART communications from a handheld terminal or the control room. This option enables additional visibility and control of the process.

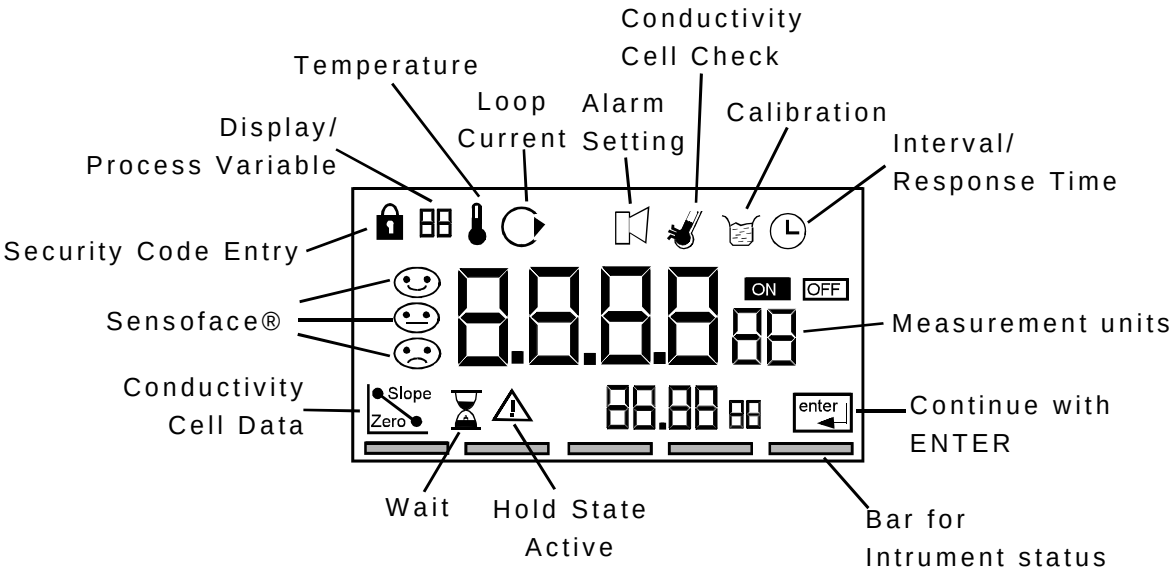


Figure 2 – APT2000CC Display Features

Features

- Large display with easy-to-read 0.75 inch measured value
- Simple operator interface with basic pictographs
- Application in hazardous and safe areas
- HART bi-directional communications protocol
- Continuous diagnostics for monitoring calibration, cell health, and transmitter self-test
- Manual loopback check for integrity of 4-20 mA output
- Robust, tightly sealed plastic enclosure
- Wall, pipe or panel mounting
- Easy installation with pre-assembled empty enclosure and plug-in terminals
- Optical alarm signaling by blinking red LED
- Integrated current source for simple checking of peripheral devices
- Quick Response Time (less than five seconds per step change)

Applications

The APT2000CC transmitter is designed to meet the measurement needs of a number of industries, including:

- Power
- Chemical
- Pharmaceutical
- Pulp and Paper
- Water Quality
- Metals

Specifications

Conductivity Input	
Display Range	(0.2 µS/cm * Cell Constant) to (1000 mS/cm * Cell Constant)
Accuracy	Less than 1 % of Measured Value or +/- (0.4 µS/cm * Cell Constant), whichever is greater
Step Change Response Time	Less than 5 seconds
Process Variable/Range	0.000 to 9.999 µS/cm, 00.00 to 99.99 µS/cm, 000.0 to 999.9 µS/cm, 0000 to 9999 µS/cm 0.000 to 9.999 mS/cm, 00.00 to 99.99 mS/cm, 000.0 to 999.9 mS/cm 0.000 to 9.999 MΩ-cm, 00.00 to 99.99 MΩ-cm, 000.0 to 999.9 MΩ-cm
Salinity	0.0 % to 45.0 % (0 °C to 35 °C)
Diagnostics	
Sensocheck	Polarization detection and monitoring of cable capacitance (can be switched off)
Sensor Standarization	- Entry of cell calibration factor with display of conductivity and temperature - Temperature probe adjustment
Sensoface	- Provides information on the electrode state via Sensocheck - Monitors asymmetry potential, slope, and response time during calibration
Temperature Input	
Range	*8550 Ω Thermistor:* –10.0 °C to +130.0 °C / –14 °F to +266 °F *Pt100/1000 Ω RTD:* –20.0 °C to +150.0 °C / +4 °F to +302 °F
Resolution	0.1 °C or 1 °F
Accuracy	< 0.5 K
Temperature Compensation	Automatic Compensation using Pt 100Ω or 1000Ω RTD, 8550Ω Thermistor or manual adjust
Display	LCD display 76 mm x 48 mm dimensions (3” x 1 7/8”), 7-segment *Cond Value:* character height 17 mm (.66") , meas. symbol 10 mm (.4") *Temperature:* character height 10 mm (.4"), meas. symbol 7 mm (.33") Sensoface with three states, 5 status bars, 16 pictographs / symbols, Red Alarm LED Security protection with four-digit mode codes to access calibration and configuration options

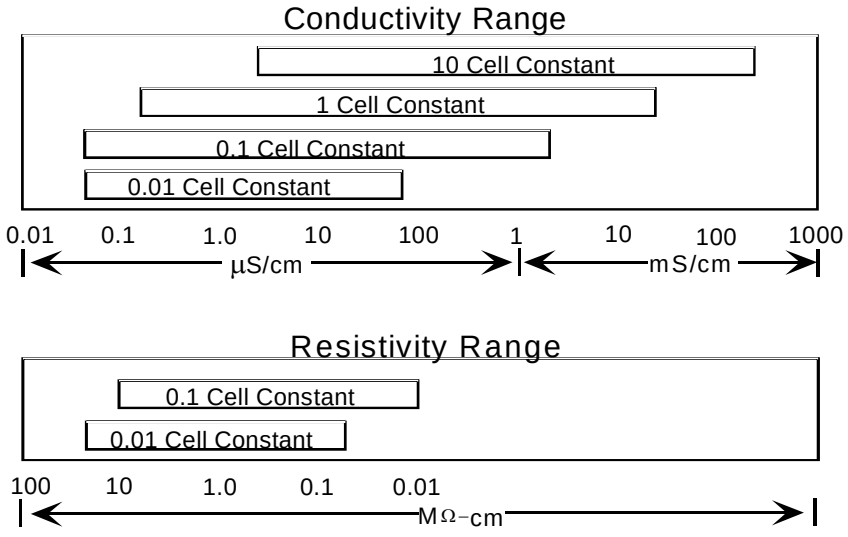


Figure 3 – Optimal Cell Constant for Conductivity or Resistivity Ranges

Supply/Output	
Output Current	4 mA to 20 mA (22 mA for error notification) current loop, floating (3.8 mA to 20.5 mA)
Supply Voltage	12 V to 42 V; I_{max} = 100 mA; P_{max} = 0.8 W
Overrange	22 mA for error messages
Current Error	<0.3 % of current value +0.05 mA
Current Source	3.80 mA to 22.0 mA

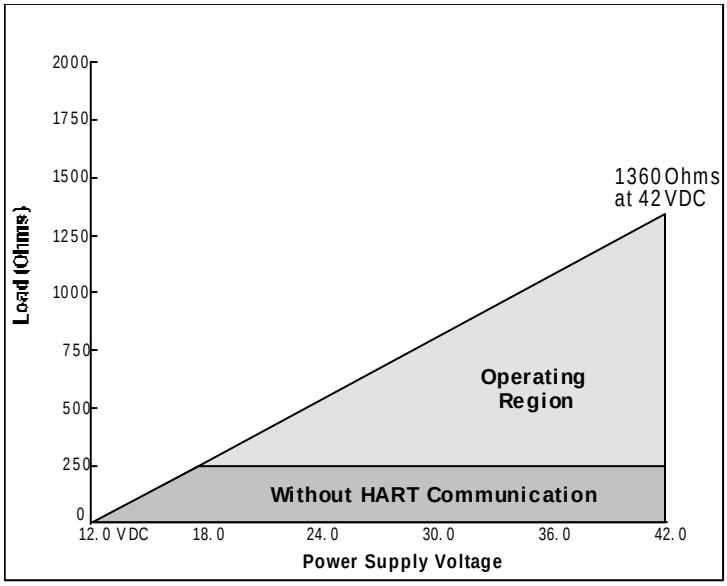


Figure 4 – Load/Power Supply Requirements

Communications	
HART Protocol	• Digital communication via FSK modulation of the loop current • Point-to-point connection • Reading of measured values, status, messages, and multidrop unit identification • Read and write parameters
Physical	
Enclosure	Plastic enclosure made of PBT (polybutylene terephthalate) bluish-gray RAL 7031
Mounting	Wall, Pipe, or Panel Mount
Dimensions	H 144 mm, W 144 mm, D 105 mm (H 5.67", W 5.67", D 4.13")
Protection	NEMA 4x, IP 65
Cable Glands	3 breakthroughs for Pg 13.5 2 breakthroughs for NPT 1/2" or Rigid metallic conduit
Weight	Approx. 1 kg (2.2 lbs)

Area Certifications / Compliances	
General Purpose	Zone 2 (USA) FM: NI, Class I, Div 2, Groups A – D, T4
Intrinsically Safe	Zone 1 (USA) FM: IS, Class I, Div 1, Groups A – D, T4 Zone 1 (Europe) CENELEC: II 2G EEx ib [ia] IIC T6
Data Retention	Parameters and calibration data > 10 years (EEPROM)
RFI Suppression / Immunity to ESD	To EN 50 081-1 and EN 50 081-2
Ambient Conditions	*Operation/Environmental temperature:* (T4)–20 °C to +55 °C (4 °F to +131 °F) (T6)–20 °C to +40 °C (–4 °F to +104 °F) *Transport and Storage temperature:* –20 °C to +70 °C (–4 °F to +158 °F)

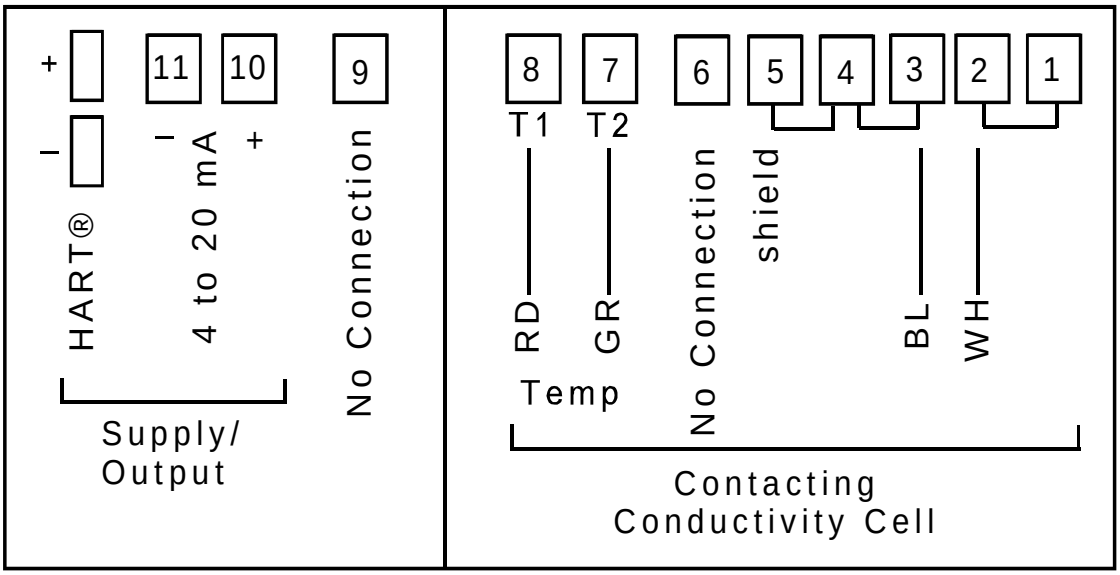


Figure 5 – APT2000CC Terminal Assignments

Instructions

- APT2000 Transmitter Offers:
  - Power Requirements - 2 Wire, 14 to 42 VDC
  - Standard - All models CE Compliant
  - Standard - NEMA 4X, IP65
  - Three mounting types: **(must be ordered separately)**
    1. Panel Mount Kit
    2. Pipe/Wall Mount Kit
    3. Protective Hood (requires Pipe/Wall Mount Kit)
  - Optional - HART communications
  - Approval Options:
    1. General Purpose; also FM Class I, Div 2, Groups A-D
    2. Intrinsically Safe: FM Class I, Div 1, Groups A-D
       CENELEC EEx ib [ia] 11C T6/T4

- Select the desired key number. The arrow to the right marks the selection available.
- Make one selection from Tables using the column below the proper arrow.
  A dot (•) denotes unrestricted availability.

Key Number ⌈ _ _ _ _ _ _ _ _ _ _ ⌉ - **I** ⌈ _ ⌉ - **II** ⌈ _ _ ⌉ - **III** ⌈ _ _ _ ⌉

KEY NUMBER	**Selection**	**Availability**		
Description of Measurement Type				
pH/ORP	APT 2000 PH	↓		
Glass Electrodes: Internal pre-amp used				
Durafet II Electrodes: Cap adapter is required				
Toroidal (Electrodeless) Conductivity	APT 2000 TC		↓	
Contacting Conductivity	APT 2000 CC			↓

TABLE I - Communications Protocol

None (Analog 4 - 20 mA only)	0	•	•	•
HART Protocol	H	•	•	•

TABLE II - Approvals

General Purpose; also FM Class I, Div 2, Groups A-D	00	•	•	•
Intrinsically Safe: FM Class I, Div 1, Groups A-D CENELEC EEx ib [ia] IIC T6/T4	IS	•		•

TABLE III - Optional Equipment

User's Manual	English	E _ _	•	•	•
Future		_ 0 _	•	•	•
Future		_ _ 0	•	•	•

Accessory Parts	**Part Number**
Mounting Kits:	
Panel Mounting Kit	51205990-001
Pipe/Wall Mounting Kit	51205988-001
Protective Hood (requires pipe/wall kit)	51205989-001
HART Test Socket	51205991-001
Instruction Manual - pH	70-82-25-92
Instruction Manual - Toroidal (Electrodeless) Conductivity	70-82-25-96
Instruction Manual - Contacting Conductivity	70-82-25-95

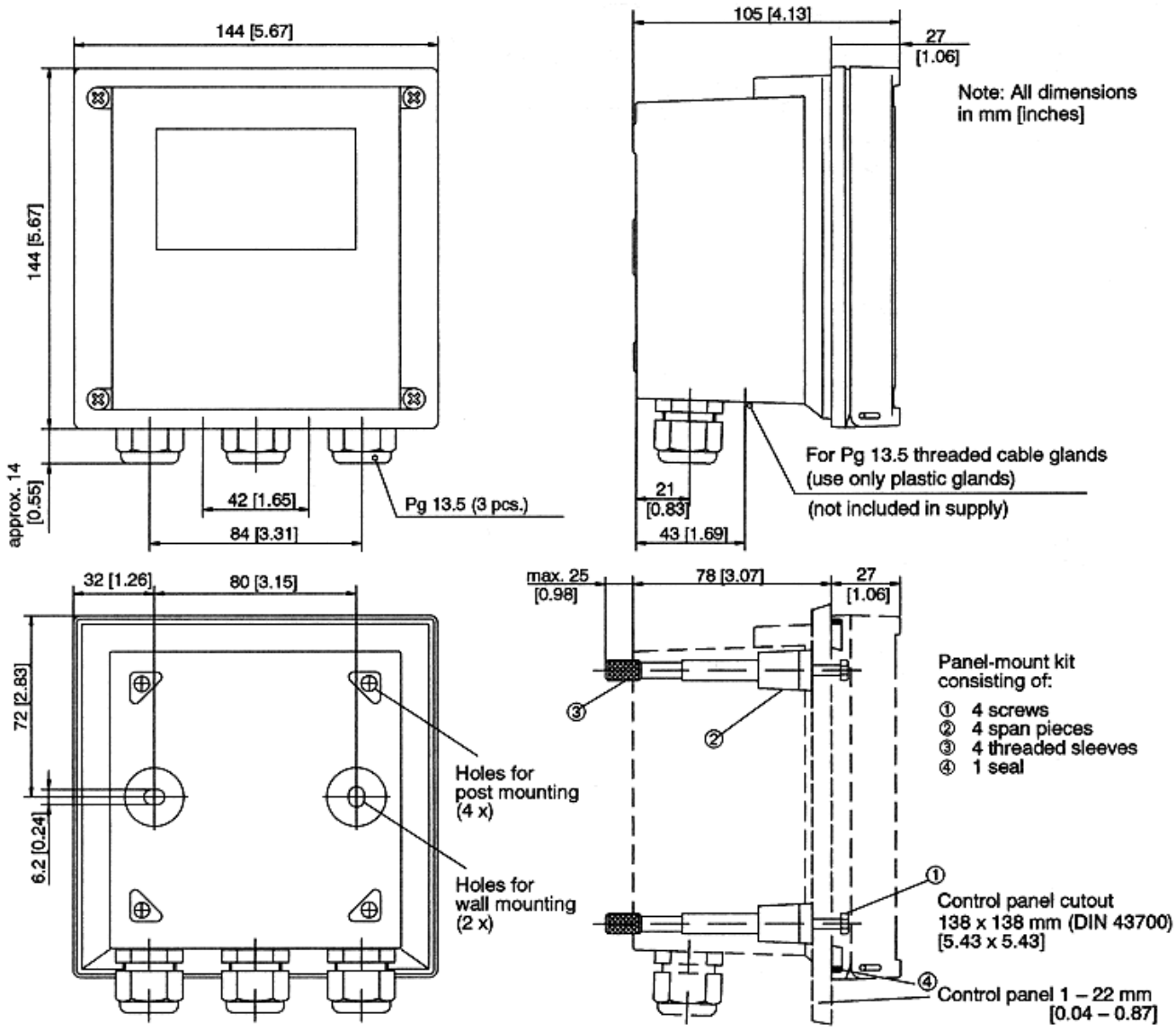


Figure 6 – Dimension Drawing for APT2000 and P/N 51205990-001 Panel Mounting Kit

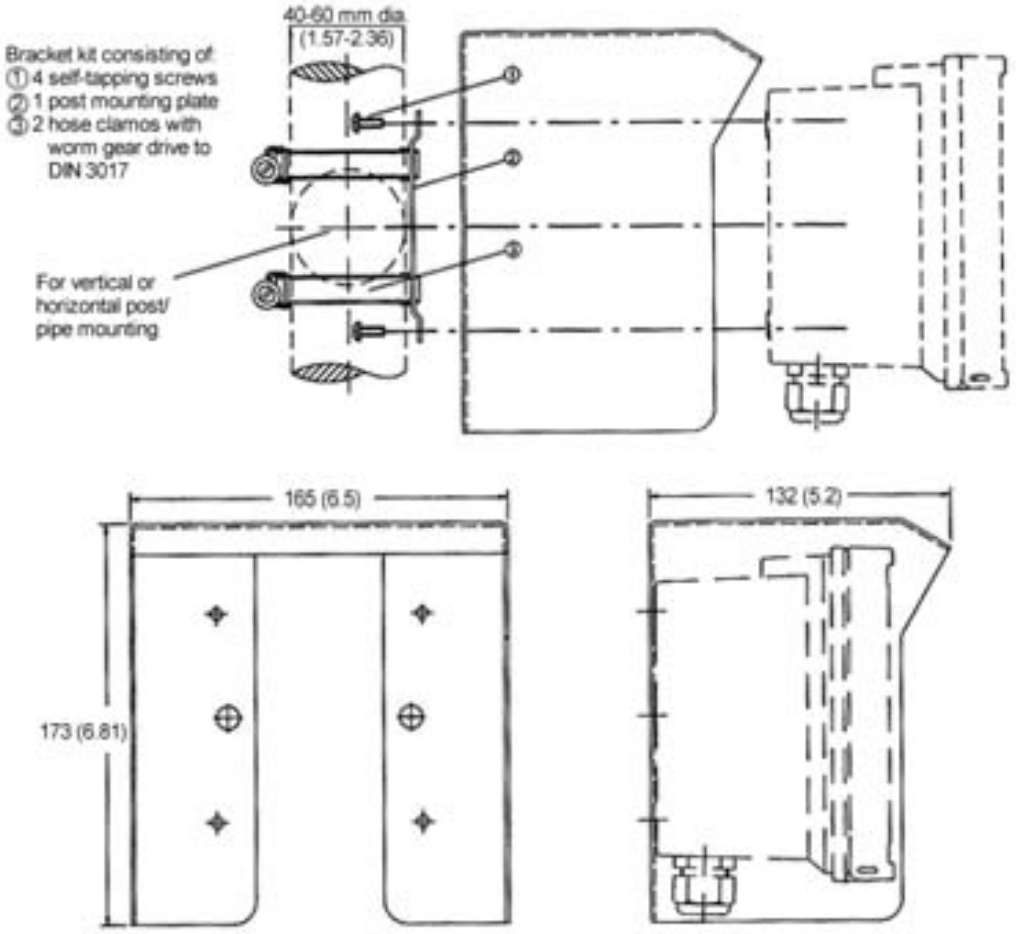


Figure 7 – Dimension Drawing for APT2000 with Wall or Pipe Mounting

Warranty/Remedy

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While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

For More Information

Learn more about how Honeywell's 2-Wire Contacting Conductivity Transmitters can continuously measure conductivity; resistivity and salinity in industrial processes visit our website www.honeywell.com/ps/hfs or contact your Honeywell account manager.

Honeywell Process Solutions
1860 West Rose Garden Lane
Phoenix, Arizona 85027
Tel: 1-800-423-9883 or 1-800-343-0228
www.honeywell.com/ps

70-82-03-33
March 2001

Honeywell

2-Wire Toroidal Conductivity Transmitters Series APT2000 Specifications

70-82-03-35 March 2001

Overview

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Quick Problem Assessment

The APT2000 has a large front display for quick recognition of process parameters and diagnostics even at a distance. Only the APT2000 employs *visual feedback* to quicken setup and maintenance times and to minimize errors made during calibrations. Visual feedback refers to pictograph type characters that appear on the display both to prompt and respond to operator and process changes.

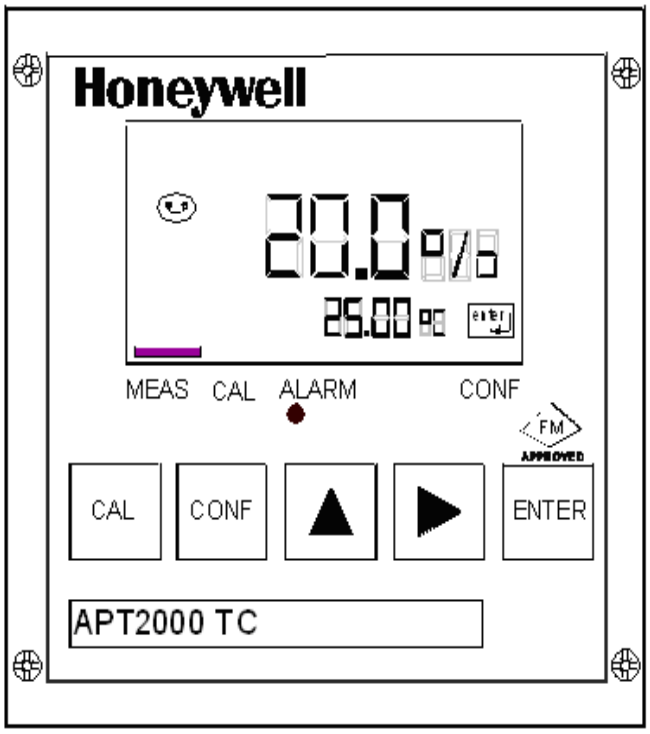


Figure 1 – APT2000TC Transmitter

Pictograph type characters also appear during problem conditions to report diagnostics for easy trouble-shooting. There is even a Sensoface® pictograph that provides constant feedback to the operator on whether or not there is a problem with the cell. These easily learned and recognized symbols make the APT2000 an easy-to-use instrument in any language.

Foolproof Calibrations

Each Honeywell conductivity cell has unique measuring characteristics when shipped from the factory. It is possible that these characteristics will vary slightly depending upon the installation as well. For optimum accuracy, a single-point calibration in a known conductivity solution should be performed when a new cell is installed. Further calibration adjustments are also available for enhanced accuracy in special applications.

Works with a Variety of Cells

The inputs to the APT2000 Series include the Honeywell 5000TC toroidal conductivity cells, which feature a 1000 ohm Platinum RTD. In addition, a wide variety of other manufacturers' toroidal conductivity cells are compatible.

Fully Certified

The area certification for the ATP2000 TC is FM Class I, Div. 2, Groups A-D (non-incendive). In addition, each transmitter comes standard with CE.

Easily Integrated

The APT2000 Series transmitters can be continuously remote controlled via HART communications from a handheld terminal or the control room. This option enables additional visibility and control of the process.

Applications

The APT2000TC transmitter is designed to meet the measurement needs of a number of industries, including:

- Chemical
- Food & Dairy
- Pulp and Paper
- Refinery
- Metals

Features

- Large display with easy-to-read 0.75 inch measured value
- Simple operator interface with basic pictographs
- Application in hazardous and safe areas
- HART bi-directional communications protocol
- Continuous diagnostics for monitoring calibration, cell health, and transmitter self-test
- Manual loopback check for integrity of 4-20 mA output
- Robust, tightly sealed plastic enclosure
- Wall, pipe or panel mounting
- Easy installation with pre-assembled empty enclosure and plug-in terminals
- Optical alarm signaling by blinking red LED
- Integrated current source for simple checking of peripheral devices
- Quick Response Time (less than five seconds per step change)

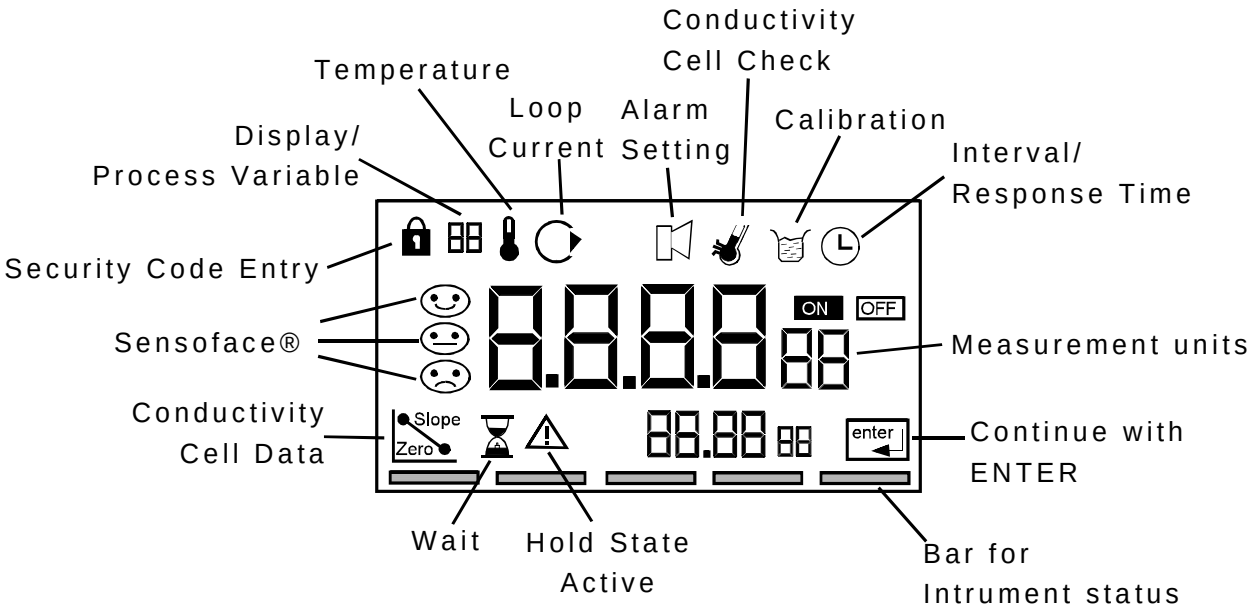


Figure 2 – APT2000TC Display Features

Specifications

Conductivity Input				
Conductivity Range	00.00 to 99.99 mS/cm, 000.0 to 999.9 mS/cm, 0000 to 1999 mS/cm			
Concentration Range	NaCl HCl NaOH	0-26.3% by wt (0 °C) 0-28.1 % by wt (100 °C) 0-17% by wt (-20 °C) 0-17 % by wt (50 °C) 0-12% by wt (0 °C) 0-22 % by wt (100 °C)	H_2SO_4 H_2SO_4 HNO_3	0-25% by wt (-17 °C) 0-35 % by wt (110 °C) 95-99 % by wt (-10 °C) 95-99 % by wt (110 °C) 0-28 % by wt (-20 °C) 0-28 % by wt (50 °C)
Salinity Range	0.0 % to 45.0 % (0 °C to 35 °C)			
Accuracy	(1 % of measured value) ± (0.02 mS/cm) ± (1 of least significant digit)			
Step Change Response Time	Less than 5 seconds			
Diagnostics				
Sensocheck	Polarization detection and monitoring of cable capacitance (can be switched off)			
Sensor Standarization	- Entry of cell calibration factor with display of conductivity and temperature - Temperature probe adjustment			
Sensoface	- Provides information on the electrode state via Sensocheck - Monitors asymmetry potential, slope, and response time during calibration			
Temperature Input				
Range	*Pt100/1000 Ω RTD, 100K Ω Thermistor:*	–20.0 °C to +150.0 °C / +4 °F to +302 °F		
Resolution	*Pt100/1000 Ω RTD, 100K Ω Thermistor:*	0.1 °C or 1 °F		
Accuracy	*Pt1000 Ω RTD* *Pt100 Ω RTD:* *100K Ω Thermistor:*	*:* ± 0.5 °C ± 1 °C ± 0.5 °C below 100 °C; less than 1 °C above 100 °C		
Temperature Compensation	Automatic Compensation using Pt 100Ω/1000Ω RTD or 100 KΩ Thermistor, or manual adjust			
Display	LCD display 76 mm x 48 mm dimensions (3” x 1 7/8”), 7-segment *Cond Value:* character height 17 mm (.66") , meas. symbol 10 mm (.4") *Temperature:* character height 10 mm (.4"), meas. symbol 7 mm (.33") Sensoface with three states, 5 status bars, 16 pictographs / symbols, Red Alarm LED Security protection with four-digit mode codes to access calibration and configuration options			
Calibration				
Sensor Standardization Options	*Calibration by Cell Factor:* 0.100 to 19.99 *Calibration by Transfer Ratio:* 1.00 to 99.99 *Zero Point Air Calibration:* ± 0.5 mS/cm offset (low conductivity measurements) Calibration by Standardizing Solution			
Test Mode	Resistance measurement by use of fixed resistor temporarily inserted through the sensor bore.			

Supply/Output	
Output Current	4 mA to 20 mA (22 mA for error notification) current loop, floating (3.8 mA to 20.5 mA)
Supply Voltage	14 V to 42 V; I_{max} = 100 mA; P_{max} = 0.8 W
Overrange	22 mA for error messages
Current Error	<0.3 % of current value +0.05 mA
Current Source	3.80 mA to 22.0 mA

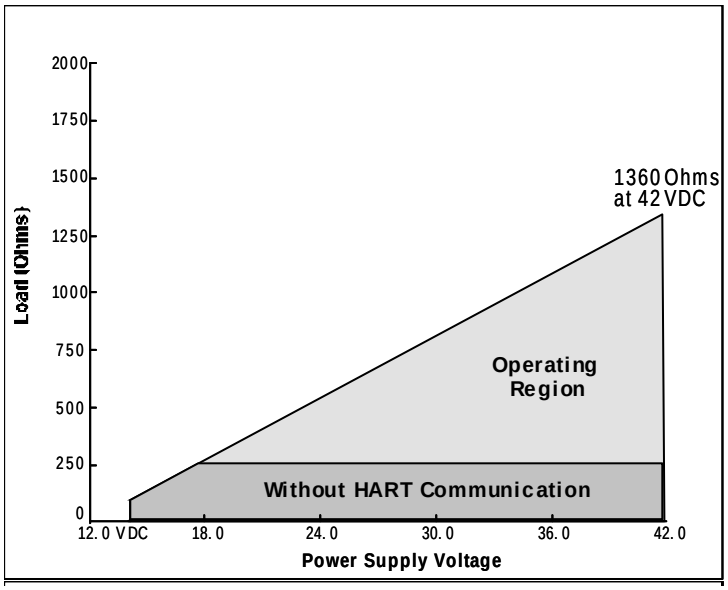


Figure 3 – Load/Power Supply Requirements

Communications	
HART Protocol	Digital communication via FSK modulation of the loop current Point-to-point connection Reading of measured values, status, messages, and multidrop unit identification Read and write parameters
Physical	
Enclosure	Plastic enclosure made of PBT (polybutylene terephthalate) bluish-gray RAL 7031
Mounting	Wall, Pipe, or Panel Mount
Dimensions	H 144 mm, W 144 mm, D 105 mm (H 5.67", W 5.67", D 4.13")
Protection	NEMA 4x and IP 65
Cable glands	3 breakthroughs for Pg 13.5 2 breakthroughs for NPT 1/2" or Rigid metallic conduit
Weight	Approximately 1 kg (2.2 lb.)

Area Certifications / Compliances	
Approvals	FM Class 1, Div. 2, Groups A-D
Data Retention	Parameters and calibration data > 10 years (EEPROM)
RFI Suppression / Immunity to ESD	To EN 50 081-1 and EN 50 081-2
Ambient Conditions	*Operation/Environmental temperature:* (T4) –20 °C to +55 °C (–4 °F to +131 °F) (T6) –20 °C to +40 °C (–4 °F to +104 °F) *Transport and Storage temperature:* –20 °C to +70 °C (–4 to +158 °F)

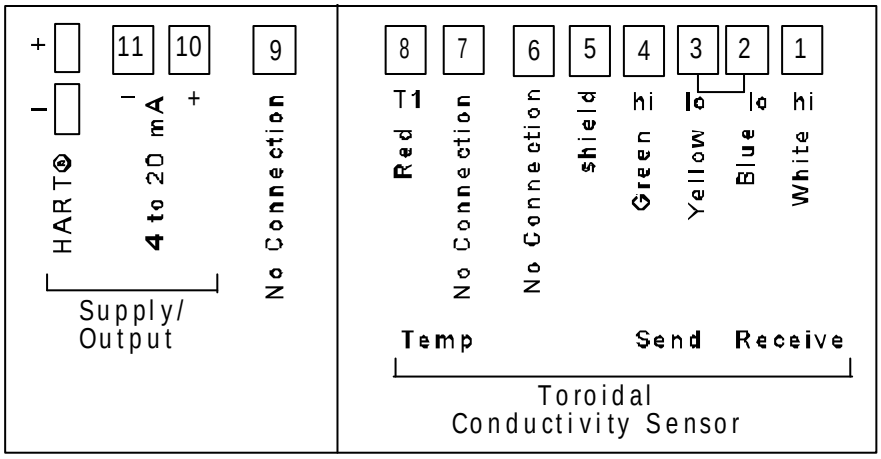


Figure 4 – APT2000TC Terminal Assignments

Model Selection Guide

Instructions

- APT2000 Transmitter Offers:
  - Power Requirements - 2 Wire, 14 to 42 VDC
  - Standard - All models CE Compliant
  - Standard - NEMA 4X, IP65
  - Three mounting types: **(must be ordered separately)**
    1. Panel Mount Kit
    2. Pipe/Wall Mount Kit
    3. Protective Hood (requires Pipe/Wall Mount Kit)
  - Optional - HART communications
  - Approval Options:
    1. General Purpose; also FM Class I, Div 2, Groups A-D
    2. Intrinsically Safe: FM Class I, Div 1, Groups A-D
       CENELEC EEx ib [ia] 11C T6/T4
- Select the desired key number. The arrow to the right marks the selection available.
- Make one selection from Tables using the column below the proper arrow.
  A dot (•) denotes unrestricted availability.

Key Number ⌈ _ _ _ _ _ _ _ _ _ _ ⌉ - **I** ⌈ _ ⌉ - **II** ⌈ _ _ ⌉ - **III** ⌈ _ _ _ ⌉

KEY NUMBER Description of Measurement Type	Selection	Availability ↓	↓	↓
pH/ORP Glass Electrodes: Internal pre-amp used Durafet II Electrodes: Cap adapter is required	APT 2000 PH	↓		
Toroidal (Electrodeless) Conductivity	APT 2000 TC		↓	
Contacting Conductivity	APT 2000 CC			↓

TABLE I - Communications Protocol

None (Analog 4 - 20 mA only)	0	•	•	•
HART Protocol	H	•	•	•

TABLE II - Approvals

General Purpose; also FM Class I, Div 2, Groups A-D	00	•	•	•
Intrinsically Safe: FM Class I, Div 1, Groups A-D CENELEC EEx ib [ia] IIC T6/T4	IS	•		•

TABLE III - Optional Equipment

User's Manual	English	E _ _	•	•	•
Future		_ 0 _	•	•	•
Future		_ _ 0	•	•	•

Accessory Parts	Part Number
Mounting Kits (ordered separately from Transmitter)	
Panel Mounting Kit	51205990-001
Pipe/Wall Mounting Kit	51205988-001
Protective Hood (requires pipe/wall kit)	51205989-001
HART Test Socket	51205991-001
Instruction Manual - pH	70-82-25-92
Instruction Manual - Toroidal (Electrodeless) Conductivity	70-82-25-96
Instruction Manual - Contacting Conductivity	70-82-25-95

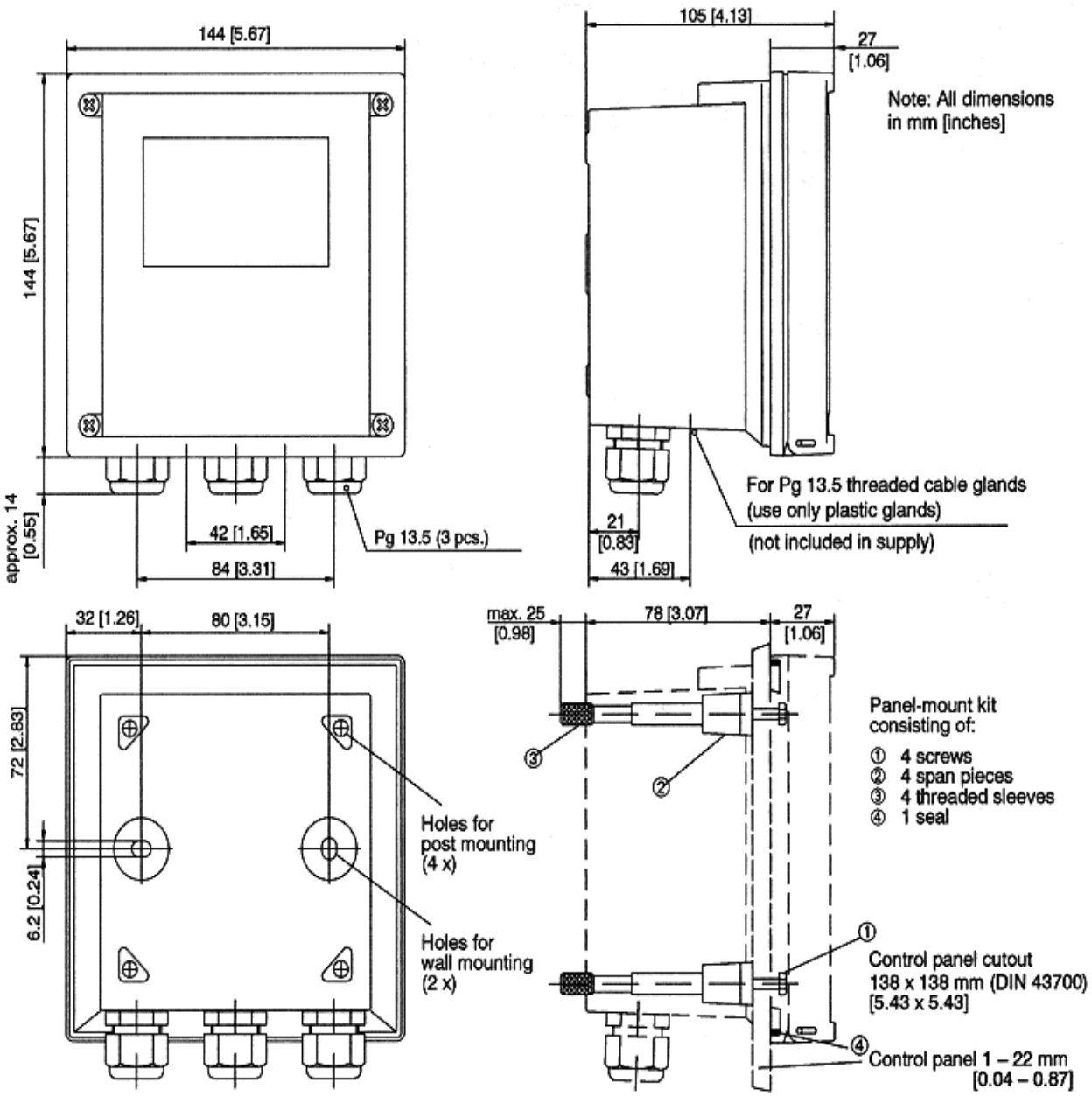


Figure 5 – Dimension Drawing for APT2000 and P/N 51205990-001 Panel Mounting Kit

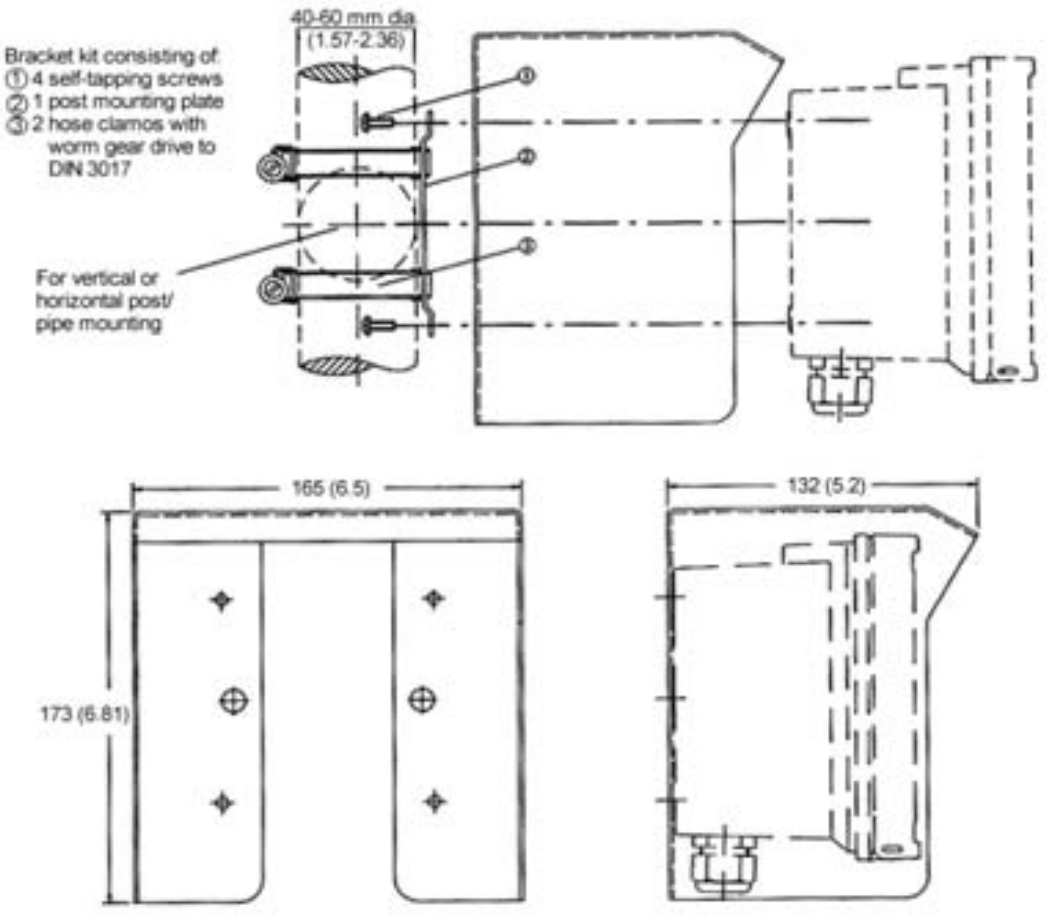


Figure 6 – Dimension Drawing for APT2000 with Wall or Pipe Mounting

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose**. Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

For More Information

Learn more about how Honeywell's 2-Wire Toroidal Conductivity Transmitters can be used in a wide range of industrial processes, visit our website www.honeywell.com/ps/hfs or contact your Honeywell account manager.

Honeywell Process Solutions
1860 West Rose Garden Lane
Phoenix, Arizona 85027
Tel: 1-800-423-9883 or 1-800-343-0228
www.honeywell.com/ps

70-82-03-35
March 2001

Technical Information

Honeywell

DL423 DirectLine Sensor Module for Conductivity Measurement Specifications

70-82-03-47 January 2003

Overview

DirectLine® DL423 for Conductivity measurement is a family of sensors released by Honeywell as part of a new generation of analytical measurement. The DirectLine sensor's unique architecture combines the latest in microelectronics technology with the proven performance of Honeywell conductivity cell, to provide unequaled savings during installation, start-up, operation, and maintenance.

The DirectLine electronics module can mount integrally on the conductivity cell and provide a 4-20 mA dc output proportional to conductivity. The output of the DirectLine sensor connects directly to any host monitor or control device that accepts standard 4-20 mA inputs and provides external loop power including:

- Honeywell UDC3300 1/4-DIN Controller
- UMC800 Controller
- PLCs with analog inputs
- DCS systems
- A host of recorder/controller products

For conductivity cell submersion or special mounting applications, the electronics module is also available in a remote-mounting configuration.

Description

The Honeywell DirectLine architecture consists of an electronics module integral to the conductivity cell. This design eliminates the need and added cost of a separate analyzer or transmitter.

The electronics module is sealed in a plastic weatherproof, corrosion-resistant housing and is connected to the conductivity cell on one side and a 4 20 mA output cable on the other via waterproof connectors. This housing design allows this system to be used in harsh environments where moisture and dust is a problem.

For special mounting applications, the remote mounting option connects the electronics module to the conductivity cell via a cable. The electronics module is then mounted on a 2-inch pipe, wall, or DIN rail.

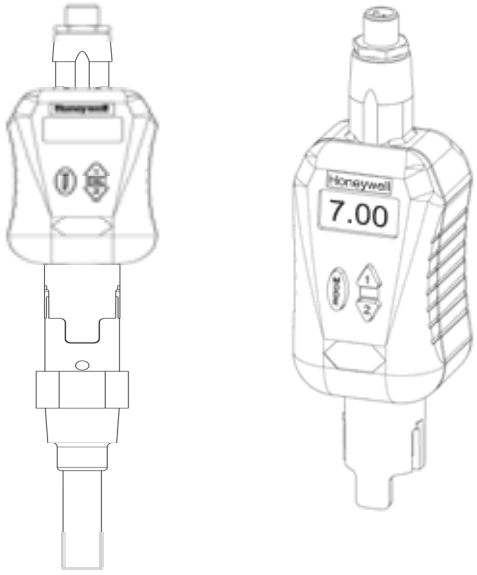


Figure 1 — DirectLine DL423 Sensor

Features

- **Direct 4-20 mA output** eliminates need for dedicated analyzers or transmitters, simplifying installation, start-up, operation, and maintenance tasks. Installation costs are also reduced because standard cable can be used for additional cable distances.
- **Automatic upload of cell constant and cell calibration factor** from cell EEPROM reduces set-up time.
- **Integral electronics with local HMI** simplifies installation and shortens calibration times.
- **Modular plug-in construction** simplifies electrode replacements.

Features Continued

- **Local display and keypad** facilitates quick set-up, calibration, and operational activities.
- **½" NPT conduit** connection provides increased protection and noise immunity of output cable.
- **Plug-in modular design** allows sensor to be safely removed and replaced without cycling power on the electronics module.
- **Electronics and sensor diagnostics** reduces troubleshooting times.
- **Trim value or 1-point solution calibration options** accommodates individual calibration techniques and reduces calibration time.
- **Temperature Sensor calibration options** for more accurate measurements.
- **Playing card-sized guide** facilitates simple, correct, and consistent calibration and configuration.
- **Watertight sensor connection** for reliability in submersion applications.
- **Global approvals** including:
  - CE Mark for industrial applications
  - UL General Purpose
  - CSA General Purpose
  - IP66 Type 4x Enclosure
  - FM Class I, Div. 1 (I.S.)
  - FM Class I, Div. 2 (non-incendive field wiring)

Electronics Module

Integral Electronics/Sensor Design

The DirectLine electronics module is loop-powered by 16-42 Vdc source and will modulate its supply current from 4-20 mA, depending upon the conductivity value sensed by the cell. The output cable connects to the electronics module by a waterproof connector. The DirectLine sensor's output cable connector is a standard M12 type receptacle. The M12 receptacle easily connects to a cord-set with an M12 connector or an M12 field wiring connector and customer-supplied cable.

The DL423 module quickly attaches to the cell and is easily locked-in-place for assured safety and reliability during operation. The cell can be removed from the module safely without disrupting power to the electronics.

Remote Mounting Applications

For special mounting applications, a remote electronics module option is available. The remote electronics module is mounted on a 2-inch pipe, wall, or DIN rail. The remote sensor cable directly connects the electronics module to the sensor with a submersible connector. The remote sensor cable is available in 20-ft. and is integral with the conductivity cell.

Operator Interface

The DirectLine electronics module configuration, calibration, and maintenance functions are performed locally from three buttons and a 4-digit, 7-segment LCD display on the front side of the electronics module. The process variable, temperature (if available), and any error diagnostics are viewable from the local LCD display.

The following configuration functions are available.

- PV Type (Conductivity, Resistivity, TDS, and Concentration)
- TDS Factor
- Temperature Compensation Type
- Output configuration
- Noise suppression frequency selection

A playing card-sized guide comes with each DirectLine sensor to guide you through a configuration or calibration quickly.

Online Diagnostics

The DirectLine sensor continuously performs self-diagnostics on both the electronics and sensor. These prioritized self-diagnostics help to minimize the time and expense of troubleshooting during start-ups, maintenance, and calibrations. If a problem arises with either the module electronics or the sensor, the software prioritizes the problem type and displays only the highest priority error diagnostic thus simplifying the troubleshooting process. Once the diagnostic is corrected, the error code disappears from the display.

If the electrode's temperature or process variable value goes out of operation range, the output current is driven to approximately 21.8 mA to inform the host device of a problem. Once the problem is corrected, the output current is returned back to normal and the error code disappears. Error codes are also used to indicate calibration failures.

Conductivity Cells

Honeywell's extensive lines of conductivity cells are compatible with the DL423 Sensor Module. These cells are ruggedly constructed for reliable, continuous measurement of electrolytic conductivity up to 140ºC and 250 psig.

The DL4000 line of conductivity cells are used with the DL423. An integral or remote configuration is available, depending on the process installation.

The integral conductivity cell design can be used for in-line and flow cell types of installations.

For immersion or ball valve mountings, a remote cell design is required. The remote cell design employs a cable integral to the cell that is connected to the DirectLine Sensor Module.

The conductivity cell bodies are constructed of polyethersulfone (PES) for excellent corrosion resistance in a wide range of applications. Cell constants are available for applications ranging from ultrapure water to acid/base concentrations.

DL4000 Conductivity Cells have an EEPROM with the cell constant and cell calibration factor programmed into it. These values are automatically uploaded into the DirectLine Sensor Module. This eliminates the need for the user to manually do this and reduces configuration errors.

Specifications

Display Ranges	Conductivity: 0 to 2000 µS/cm, 0 to 20.00 mS/cm, 0 to 1000 mS/cm Resistivity: 0 to 20.00 MΩ-cm Total Dissolved Solids (TDS): 0 to 2000 ppm, 0 to 2000 ppb, 0 to 200ppt % Concentration: 0 to 20.00%
Displayed Temperature Range	–10 °C to +140 °C (14 °F to 284 °F)
Display Accuracy	Conductivity/Resistivity: Greater of +/- 2 counts or +/- 0.5% of reading Concentration: +/- 0.5% of reading Temperature: +/- 0.1°C from –10 to 99.9°C, +/- 1°C from 100 to 140 °C
Display Resolution	4 digits, floating decimal point
Process Temperature	–10 °C to +140 °C (14 °F to 284 °F)
Electronics Module Ambient Temperature	–20 °C to +85 °C (–4 °F to +185 °F)
Output Type	4-20 mA (2-wire loop powered)
Output Calibration	4-20 mA
Cell Constant and Cell Calibration Factor Input	Automatic from EEPROM in Conductivity Cell
Output (Loop) Cable Connection	M12 Type
Output (Loop) User Termination	Tinned leads on cord set or customer supplied cable
Cable Lengths **Remote Sensor:** **Output:**	 20 feet (cable integral to conductivity cell) 20 feet or 50 feet
Power	16-42 Vdc, 23mA max *Maximum load resistance:* 250 ohms at 16 Vdc 600 ohms at 24 Vdc 1400 ohms at 42 Vdc
Local Display and Buttons	LCD 4-digit, 7-segment
Engineering Units (Labels)	µS/cm, mS/cm, MΩ-cm, ppm TDS, ppb TDS, ppt TDS, %
Calibration Options	Cal Trim Factor, 1 Point Cal Solution
Solution Temperature Compensation	Acid (Cation/Ammonia), Salt (Neutral Salts), NaCl, HCl, NaOH, H_2SO_4, and None (for USP24 Conformance)
Diagnostics	Sensor and electronics
Case	Weatherproof, corrosion-resistant plastic housing
Approvals	CE Mark for Industrial Applications UL – General Purpose for Process Control CSA General Purpose for Process Control FM Intrinsically Safe, Class I, Div. 1, Groups A, B, C, D and Class I, Zone 0, AEx ia IIC FM Class I, Div. 2, Groups A, B, C, D and Class I, Zone 2, Groups IIC Enclosure: Type 4x, IP66
Remote Mounting	Pipe, Wall, or DIN Rail
Dimensions	H 123 mm (4.84”) x W 48 mm (1.89”) x D 46 mm (1.81”)
Weight	Approximately 142 g (5.0 oz.)

Dimensions

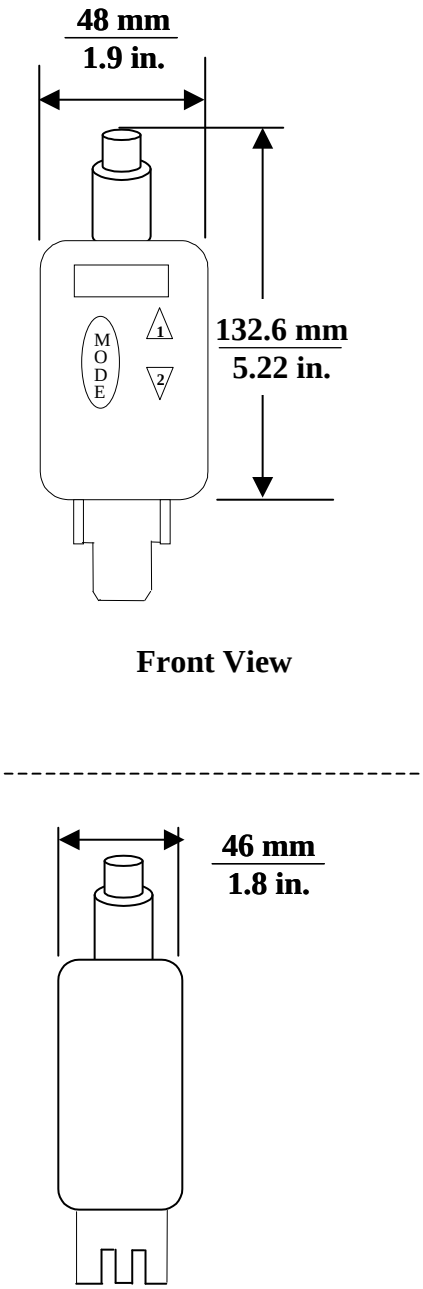


Figure 2 — Dimensions

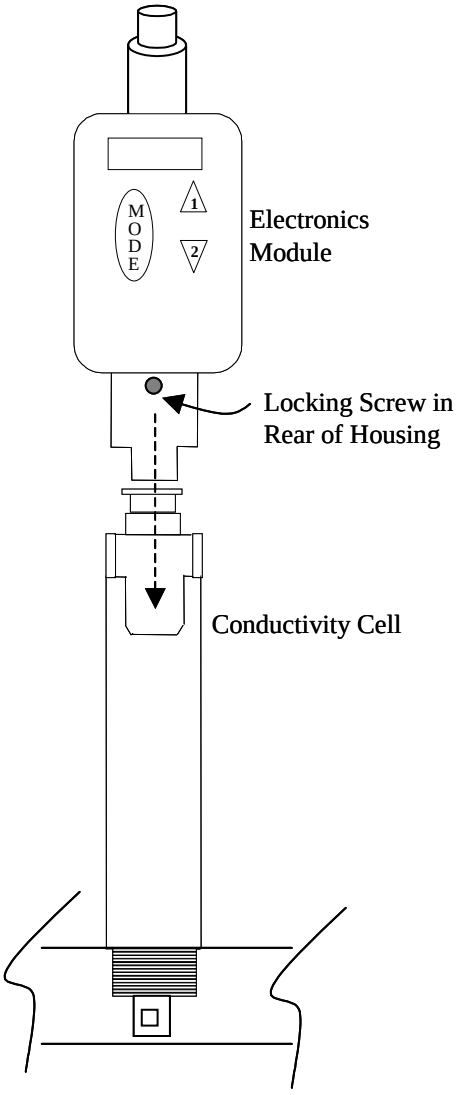


Figure 3 — Integral Mounting

Mounting

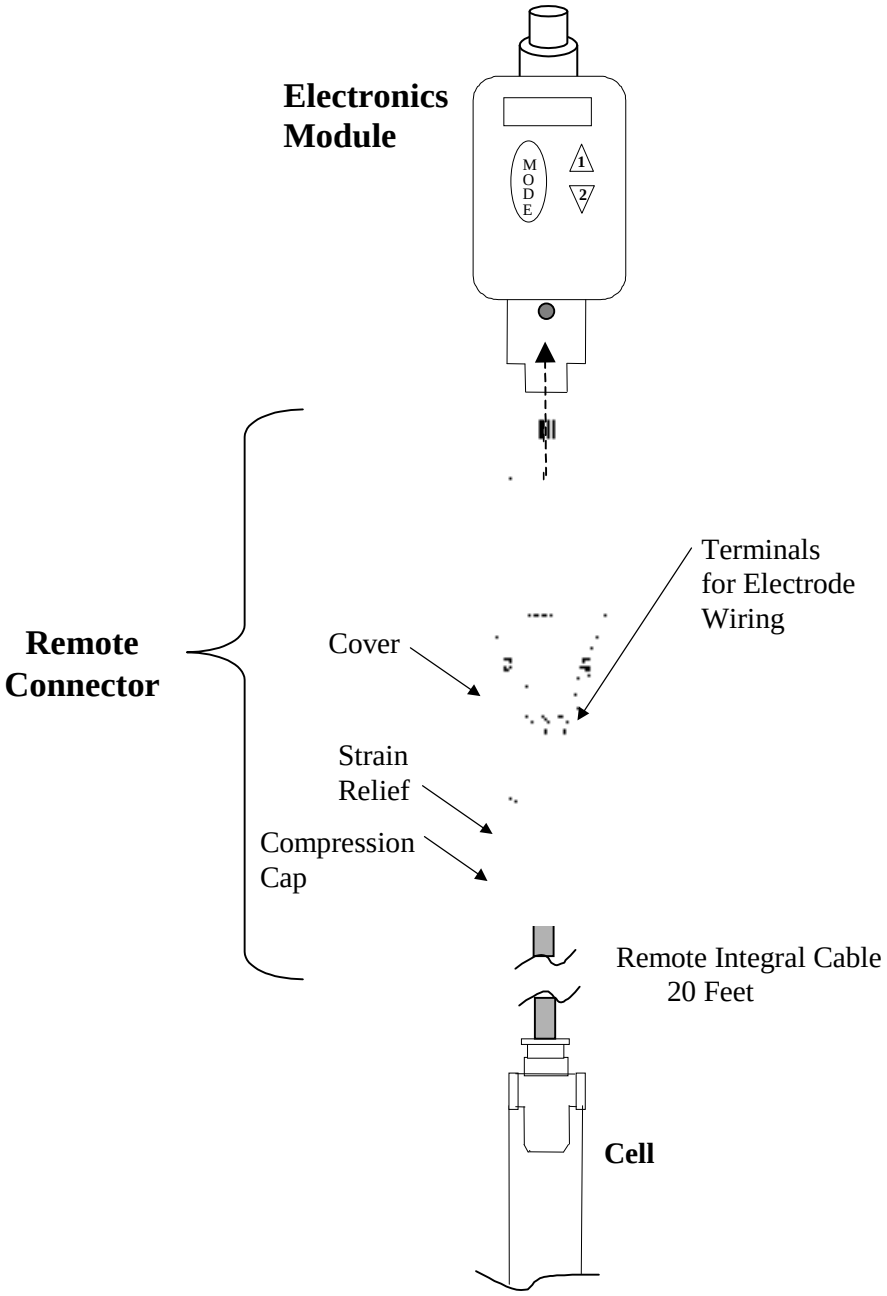
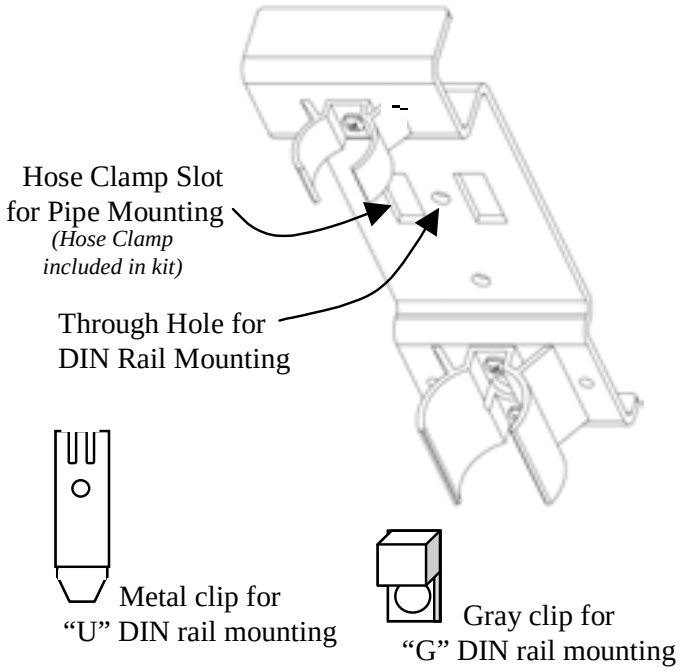


Figure 4 — Remote Mounting

Mounting



Mounting Kit

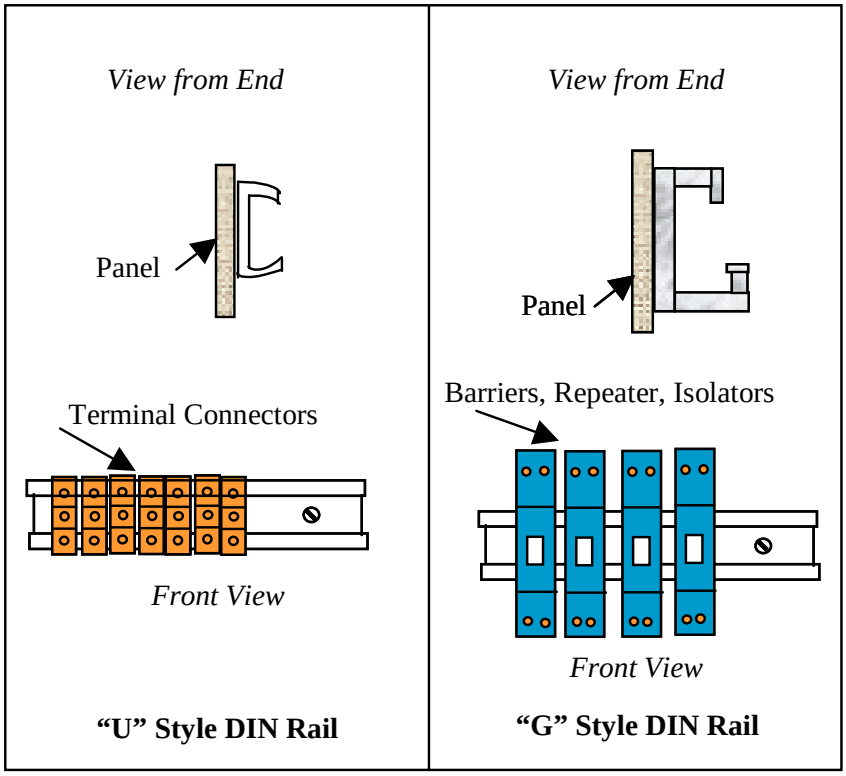


Figure 5 — Remote Mounting Hardware

Model Selection Guide

Instructions

- Select the desired key number. The arrow to the right marks the selection available.
- Make the desired selections from Tables I through IV using the column below the proper arrow. A dot (•) denotes availability.

Key Number _ _ _ _ _ - _ - _ - _ - _ _ _ _

Key Number - DirectLine® Sensor Electronics Module

(Specify electrodes/cells/probes separately)

		Selection	Availability				
pH	For use with Durafet II, Meredian II & HPW7000 pH electrodes	DL421	↓				
ORP	For use with ORP electrode.	DL422		↓			
Conductivity	For use with Contacting Conductivity Cells	DL423			↓		
DO - PPM	For use with Dissolved Oxygen ppm Probes	DL424				↓	
DO - PPB	For use with Dissolved Oxygen ppb Probes	DL425					↓

TABLE I - OUTPUT CABLE

Output Cable for Integral or Remote Mounting	None (replacement module or customer supplied output cable) *Note 1*	D	•	•	•	•	•
	Cordset - 6m (19.7 ft.) - includes connector and cable - *Note 2*	E	•	•	•	•	•
	Field Wiring Connector *only* - customer supplies cable only *Note 2*	F	•	•	•	•	•

TABLE II - SENSOR CABLE/REMOTE CONNECTOR (between electronic module and electrode, sensor or pro

Integral Mounting	No cable or connector required	0	d	d	d	d	d
Remote Mounting Cable - Durafet only	6,096m (20 ft.) of sensor cable - Durafet II Remote Mounting	1	e				
	15,24m (50 ft.) of sensor cable - Durafet II Remote Mounting	2	e				
Remote Mounting Connector (Cable is supplied with sensor or probe)	Remote Mounting Connector - Meredian II pH	3	e				
	Remote Mounting Connector - Meredian II ORP	3		e			
	Remote Mounting Connector - HPW7000	4	e				
	Remote Mounting Connector - Conductivity	5			e		
	Remote Mounting Connector - Dissolved Oxygen	6				e	e

TABLE III - REMOTE MOUNTING OPTIONS

Mounting Kit for Remote Mounting	None Integral unit - mounting not required	A	•	•	•	•	•
	2" (5,08 cm) Pipe mtg. bracket, wall mtg, & DIN Rail clip	B	•	▾	▾	•	•

TABLE IV - OPTIONS

Tagging	None	00 _ _	•	•	•	•	•
	Linen Customer ID Tag - 3 lines w/22 characters/line	LT _ _	•	•	•	•	•
	SS Customer ID Tag - 3 lines w/22 character/line	SS _ _	▾	▾	▾	▾	▾
Certificates	None	_ _ 00	•	•	•	•	•
	Calibration & Conformance	_ _ CC	▾	▾	▾	▾	▾

Notes:

1 Customer supplies cordset ***or*** cable with M12 connecter. Suppliers & P/Ns include:

	Phoenix Contact	Turck
Cord--set	SAC-3P-5.0-PUR/M12FSSH Stainless	RKV4T-6/S618
M12 Field Wiring Connector	SACC-M12FS-4CON-PG7	B8141-0
Cable	2-wire twisted shielded pair	

2 Recommended cable is 2-wire twisted shielded pair

RESTRICTIONS

Restriction Letters	Available Only With		Not Available With	
	Table	Selection	Table	Selection
d	III	A		
e	III	B		

ORDERING INSTRUCTIONS:

1. Part numbers are provided to facilitate Distributor Stock.
2. Orders may be placed either by model selection or by part number.
3. Part numbers are shown within the model selection tables to assist with compatibility information.
4. Orders placed by model selection are systematically protected against incompatibility.
5. Compatibility assessment is the responsibility of the purchaser for orders placed by part number.
6. Items labeled as N/A are not available via the stocking program and must be ordered by model selection.

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and **is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose**. Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

For More Information

Learn more about how Honeywell's DL423 DirectLine Sensor Module for Conductivity Measurement can provide unequaled savings during installation, startup, operation, and maintenance, visit our website www.honeywell.com/ps/hfs or contact your Honeywell account manager.

Honeywell Process Solutions
1860 West Rose Garden Lane
Phoenix, Arizona 85027
Tel: 1-800-423-9883 or 1-800-343-0228
www.honeywell.com/ps

70-82-03-47
January 2003

Technical Information

Honeywell

DL4000 Low Cost DirectLine Conductivity Cells Specifications

70-82-03-58 September 2007

Overview

The DL4000 conductivity cells are to be used with the DL423 DirectLine Conductivity module. The durable epoxy body construction provides for rugged and dependable conductivity sensor for light industrial applications.

DL 4000 conductivity cells are available in three cell constant configurations. Available cell constants are 0.1, 1.0 and 10.0. The 0.1 and 1.0 constant cells feature graphite measuring electrodes. The 10.0 constant cell has a platinum measuring electrode. All conductivity cells have an integral 8550 Ohm temperature compensator for accurate temperature measurement.

The conductivity cells can be mounted in-line, in a pipe tee or submersed. A simple ¾" NPT mounting gland fitting is supplied with every conductivity cell.

Features

DL4000 Conductivity Cells

- **Rugged epoxy body construction** is virtually unbreakable in most light industrial applications
- **In-line, pipe tee or submersion mounting** for a variety of installation options
- **Available cell constants: 0.1,1.0 and 10.0** for a wide measurement range
- **Graphite (0.1 and 1.0 constant) and Platinum (10.0 constant) measuring electrodes** for dependable and reliable measurement
- **¾" NPT mounting gland** provides for easy installation
- **Integral, reliable 8550 Ohm temperature compensator** ensures accurate temperature measurement
- **Integral 20' cable** for remote mounting to DL423 DirectLine Sensor Module

DL423 DirectLine Module

- **Direct 4-20 mA output** eliminates need for dedicated analyzers or transmitters, simplifying installation, start-up, operation, and maintenance tasks
- **Integral electronics with local HMI** simplifies installation and shortens calibration times
- **Local display and keypad** facilitates quick set-up, calibration, and operational activities
- **Trim value or 1-point solution calibration options** accommodates individual calibration techniques and reduces calibration time

Specifications

DL4000 Conductivity Cell	
Cell Constants	0.1, 1.0 and 10.0
Wetted Materials	0.1 and 1.0 Constants: Body: Epoxy Cell Electrode: Graphite 1.0 Constant: Body: Epoxy Cell Electrode: Platinum
Temperature Rating	0 – 65° C (32 – 149° F)
Pressure Rating	4.8 bar (70 psig)
Temperature Compensator	8550 Ohm thermistor
Cable	Integral 20’ length
Dimensions	12 mm dia body (0.5”); 152.4 mm length (6.0”)
Mounting Gland	Size: ¾” NPT male thread Body Material: Polypropylene o-ring: Buna N

For More Information

Learn more about how Honeywell’s DL4000 Low Cost DirectLine Conductivity Cells can be used in applications ranging from ultrapure water to acid/base concentrations, visit our website www.honeywell.com/ps/hfs or contact your Honeywell account manager.

Honeywell Process Solutions
1860 West Rose Garden Lane
Phoenix, Arizona 85027
Tel: 1-800-423-9883 or 1-800-343-0228
www.honeywell.com/ps

70-82-03-58
September 2007

Honeywell

Toroidal Conductivity Transmitters Series APT4000 Specifications

70-82-03-42 March 2001

Overview

The Honeywell Analytical Process Transmitter (APT) 4000 Series transmitter continuously measures conductivity, chemical concentration and salinity in industrial processes within the chemical, food and dairy, pulp and paper, refinery, metals, and other industries.

The APT4000's NEMA 4X/IP65-rated enclosure is specifically designed to meet the measurement needs of Class I, Division 2 (non-incendive) and general-purpose areas. The transmitter can be used with Honeywell toroidal conductivity cells or electrically compatible sensors. The transmitter has a universal (20-253 V ac/dc, 45-65 Hz) power supply with one 4-20 mA output, two high/low alarm relays, a diagnostic relay, and a wash relay.

Description

The Honeywell APT4000 series of transmitters offers the widest available selection of advanced features in a reliable and economical instrument.

Reliability First

The advanced features of the APT4000 transmitter guarantee complete reliability. The APT4000 continuously monitors sensor and transmitter electronics and immediately displays diagnostic information at the onset of a problem. If an error or diagnostic is found, the transmitter will indicate the appropriate error code or pictograph (see Figure 2), blink a red LED and adjust the error current to 22 mA if desired. A manual loop-back check is available to test the integrity of the 4-20 mA output.

Quick Problem Assessment

The APT4000 has a large front display for quick recognition of process parameters and diagnostics even at a distance. Only the APT4000 employs visual feedback to quicken setup and maintenance times and to minimize errors made during calibrations.

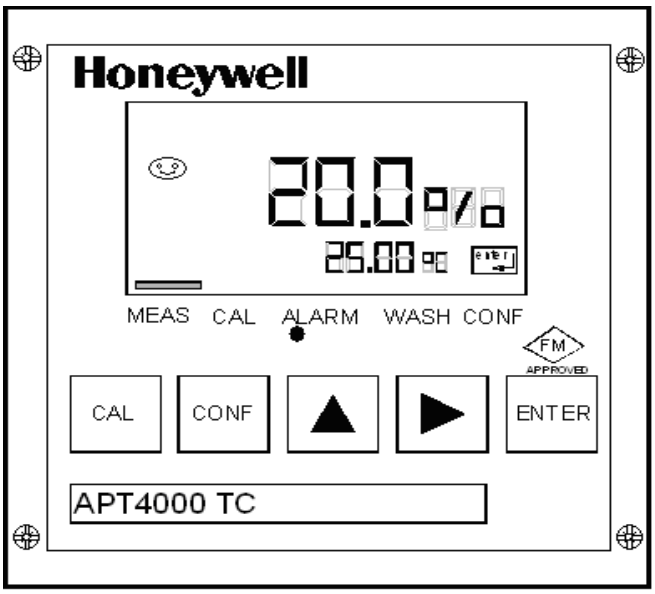


Figure 1 — APT4000 TC Transmitter

Visual feedback refers to pictograph type characters that appear on the display both to prompt and respond to operator and process changes. Pictograph type characters also appear during problem conditions to report diagnostics for easy troubleshooting. There is even a Sensoface pictograph that provides constant feedback to the operator on whether or not there is a problem with the cell. These easily learned and recognized symbols make the APT4000 an easy-to-use instrument in any language.

Foolproof Calibrations

Each Honeywell conductivity cell has unique measuring characteristics when shipped from the factory. It is possible that these characteristics will vary slightly depending upon the installation as well. For optimum accuracy, a single-point calibration in a known conductivity solution should be performed when a new cell is installed. Further calibration adjustments are also available for enhanced accuracy in special applications.

Works with a Variety of Cells

The inputs to the APT4000 Series include the Honeywell 5000TC toroidal conductivity cells, which feature a 1000 ohm Platinum RTD. In addition, a wide variety of other manufacturers' toroidal conductivity cells are compatible.

Fully Certified

The area certification for the ATP4000 TC is FM Class I, Div. 2, Groups A-D (non-incendive). In addition, each transmitter comes standard with CE.

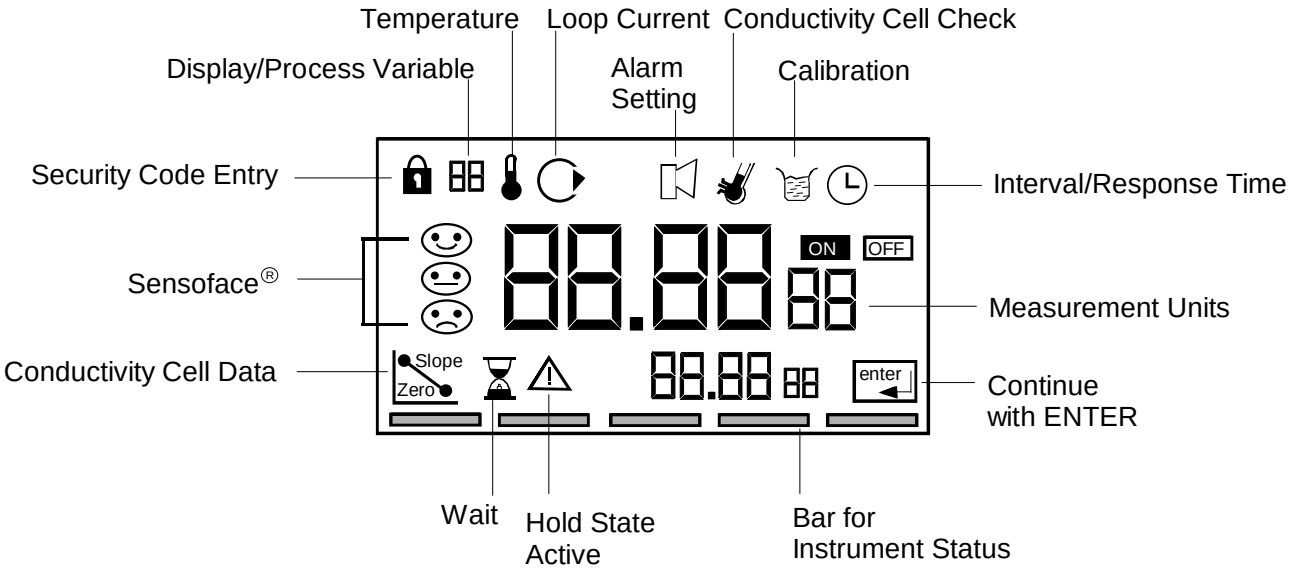


Figure 2 — APT4000 TC Display Features

Features

- Large display with easy-to-read 0.75 inch measured value
- Simple operator interface with basic pictographs
- Continuous diagnostics for monitoring calibration, cell health, and transmitter self-test
- Manual loopback check for integrity of 4-20 mA output
- Application in Class I, Division 2 or General Purpose areas
- Wall, pipe or panel mounting
- Easy installation with pre-assembled empty enclosure and plug-in terminals
- Optical alarm signaling by blinking red LED
- Integrated current source for simple checking of peripheral devices
- Quick Response Time (less than five seconds per step change)
- NEMA 4X, IP65 plastic enclosure
- Dedicated high/low alarm relay

Applications

The APT4000 TC transmitter is designed to meet the measurement needs of a number of industries, including:

- Chemical
- Food and Dairy
- Pulp and Paper
- Refinery
- Metals

Specifications

Conductivity Input		
Conductivity Range	00.00 to 99.99 mS/cm, 000.0 to 999.9 mS/cm, 0000 to 1999 mS/cm	
Concentration Range	NaCl 0-26.3 % by wt (0 °C) 0-28.1 % by wt (100 °C) HCl 0-17 % by wt (–20 °C) 0-17 % by wt (50 °C) NaOH 0-12 % by wt (0 °C) 0-22 % by wt (100 °C)	$H2SO_4$ 0-25 % by wt (–17 °C) 0-35 % by wt (110 °C) $H2SO_4$ 95-99 % by wt (–10 °C) 95-99 % by wt (110 °C) HNO_3 0-28 % by wt (–20 °C) 0-28 % by wt (50 °C)
Salinity Range	0.0 % to 45.0 % (0 °C to 35 °C)	
Accuracy	(1% of measured value) ± (0.02 mS/cm) ± (1 of least significant digit)	
Step Change Response Time	Less than 5 seconds	
Diagnostics		
Sensocheck	Polarization detection and monitoring of cable capacitance (can be switched off)	
Sensor Standarization	- Entry of cell calibration factor with display of conductivity and temperature - Temperature probe adjustment	
Sensoface	- Provides information on the electrode state via Sensocheck - Monitors asymmetry potential, slope, and response time during calibration	
Temperature Input		
Range	Pt100/1000 Ω RTD, 100 K Ω Thermistor: –20.0 °C to +150.0 °C (+4 °F to +302 °F)	
Resolution	Pt100/1000 Ω RTD, 100 K Ω Thermistor: 0.1 °C or 1 °F	
Accuracy	Pt1000 Ω RTD: ± 0.5 °C Pt100 Ω RTD: ± 1 °C 100K Ω Thermistor: ± 0.5 °C below 100 °C; less than 1 °C above 100 °C	
Temperature Compensation	Automatic Compensation using Pt 100 Ω/1000 Ω RTD or 100 K ΩThermistor, or manual adjust	
Display	LCD display 76 mm x 48 mm (3” x 1-7/8”) dimensions, 7-segment *Cond Value:* character height 17 mm (0.66") , meas. symbol 10 mm (0.4") *Temperature:* character height 10 mm (0.4"), meas. symbol 7 mm (0.33") Sensoface with three states, 5 status bars, 16 pictographs / symbols, Red Alarm LED Security protection with four-digit mode codes to access calibration and configuration options	
Calibration		
Sensor Standardization Options	*Calibration by Cell Factor:* 0.100 to 19.99 Calibration by Transfer Ratio: 1.00 to 99.99 *Zero Point Air Calibration:* ± 0.5 mS/cm offset (low conductivity measurements) Calibration by Standardizing Solution	
Test Mode	Resistance measurement by use of fixed resistor temporarily inserted through the sensor bore.	

Area Certifications / Compliances	
Approvals	FM Class I, Div. 2, Groups A-D
Data Retention	Parameters and calibration data > 10 years (EEPROM)
RFI Suppression / Immunity to ESD	To EN 50 081-1 and EN 50 081-2
Ambient Conditions	*Operation/Environmental temperature:* (T4) –20 °C to +55 °C (–4 °F to +131 °F) (T6) –20 °C to +40 °C (–4 °F to +104 °F) *Transport and Storage temperature:* –20 °C to +70 °C (–4 °F to +158 °F)
Supply/Output	
Output Current	0 mA or 4 mA to 20 mA current loop, 10 V floating
Supply Voltage	20 V to 253 V ac/dc, 45 Hz to 65 Hz, 2 VA / 1.5 W
Overrange	22 mA for error messages
Current Error	< 0.3 % of current value +0.05 mA
Current Source	3.80 mA to 22.0 mA
Output Characteristic	Linear or Logarithmic
Minimum Span	*LIN:* 5 % of the selected range *LOG:* 1 decade
Alarms/Relays	
Contacts	*Alarm minimum:* SPST N/O (Hysteresis 0.2 % of measured range) *Alarm maximum:* SPST N/O (Hysteresis 0.2 % of measured range) *Diagnostic contact:* SPST N/C *Wash contact:* SPST N/O
Maximal Current/Voltage	*AC:* < 250 V / < 3A / < 750 VA *DC:* < 30 V/ < 3A / < 90 W
Physical	
Enclosure	Plastic enclosure made of PBT (polybutylene terephthalate) bluish-gray RAL 7031
Mounting	Wall, Pipe, or Panel Mount
Dimensions	*Height:* 144 mm (5.67") *Width:* 144 mm (5.67") *Depth:* 105 mm (4.13")
Protection	NEMA 4X, IP65
Cable glands	3 breakthroughs for Pg 13.5 2 breakthroughs for NPT 1/2” or Rigid metallic conduit
Weight	Approximately 1 kg (2.2 lb.)

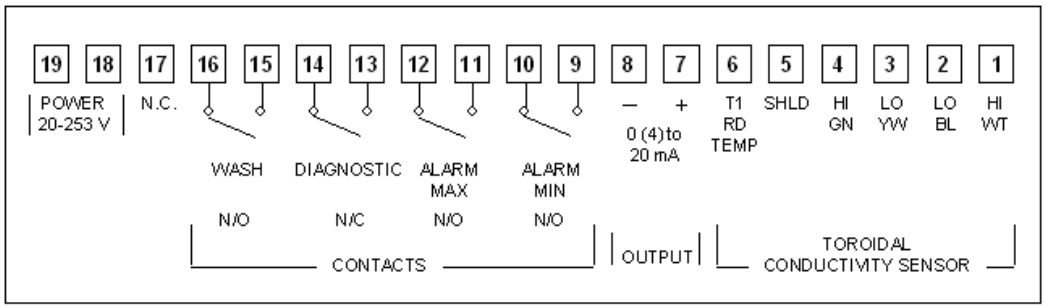


Figure 3 — APT4000TC Terminal Assignments

Model Selection Guide

Reference 51-52-16-73

Instructions

- APT4000 Transmitter Offers:
  - Power Requirements - Universal, 20 to 253V AC/DC 45 to 65 Hz
  - Standard - NEMA 4X, IP65
  - Standard Approvals:
    - General Purpose; also FM Class I, Div 2, Groups A-D
  - Standard - All models CE Compliant
  - High/Low Alarm Relays
  - Three mounting types: **(must be ordered separately)**
    - Panel Mount Kit
    - Pipe/Wall Mount Kit
    - Protective Hood (requires Pipe/Wall Mount Kit)

- Select the desired key number. The arrow to the right marks the selection available.
- Make one selection from Tables using the column below the proper arrow.
  A dot (•) denotes unrestricted availability.

Key Number _ _ _ _ _ _ _ _ _ _ - _ _ _ _

KEY NUMBER	Selection	Availability		
Description of Measurement Type				
pH/ORP	APT 4000 PH	↓		
Toroidal (Electrodeless) Conductivity	APT 4000 TC		↓	
Contacting Conductivity	APT 4000 CC			↓

TABLE I - Optional Equipment

User's Manual	English	E _ _	•	•	•
Future		_ 0 _	•	•	•
Future		_ _ 0	•	•	•

NOTE: Mounting kit not included with APT4000.

Accessory Parts	Part Number
Mounting Kits:	
Panel Mounting Kit	51205990-001
Pipe/Wall Mounting Kit	51205988-001
Protective Hood (requires pipe/wall kit)	51205989-001
Instruction Manual - pH	70-82-25-103
Instruction Manual - Toroidal (Electrodeless) Conductivity	70-82-25-104
Instruction Manual - Contacting Conductivity	70-82-25-105

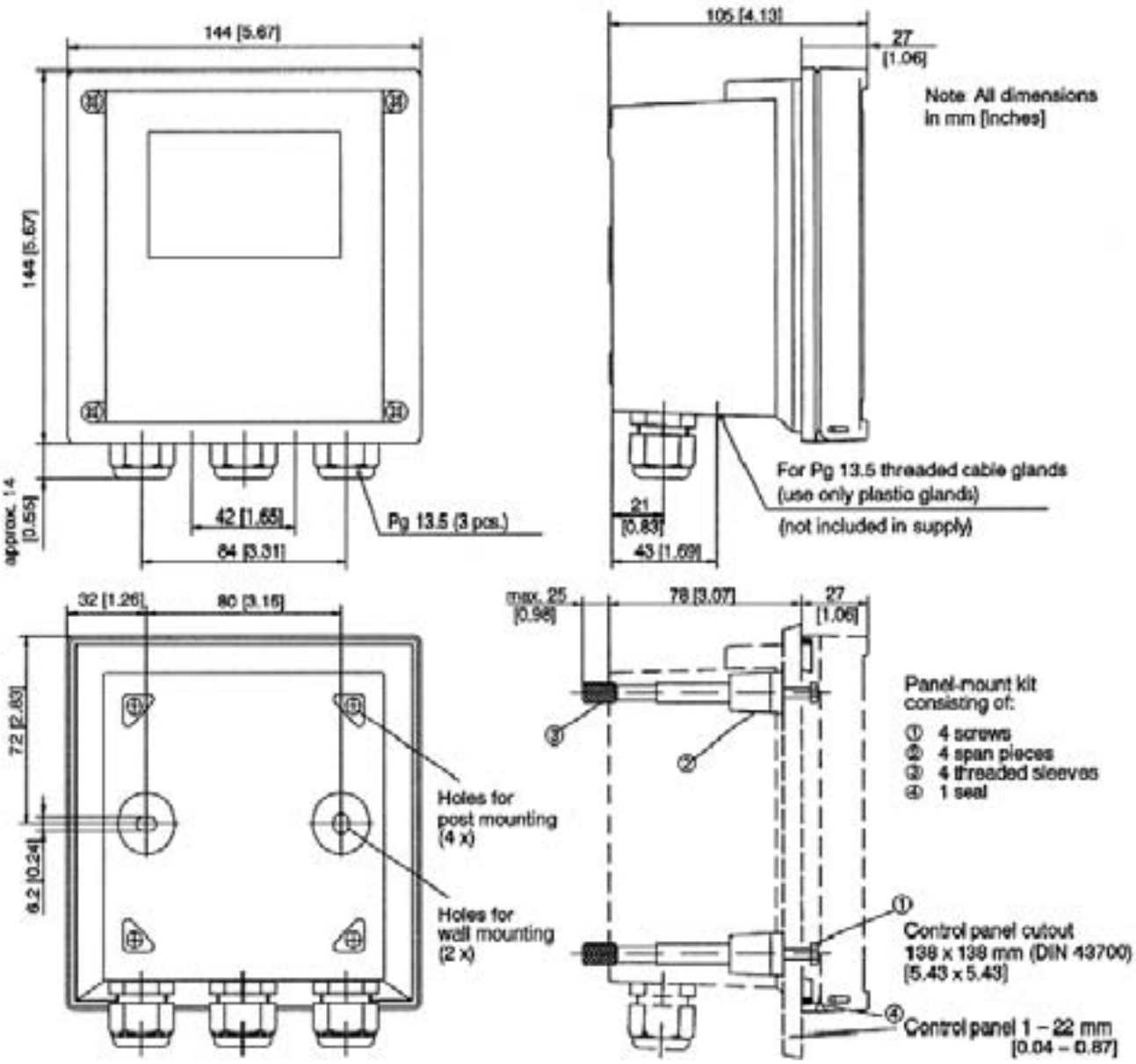


Figure 4 — Dimension Drawing for APT4000 and P/N 51205990-001 panel mounting kit

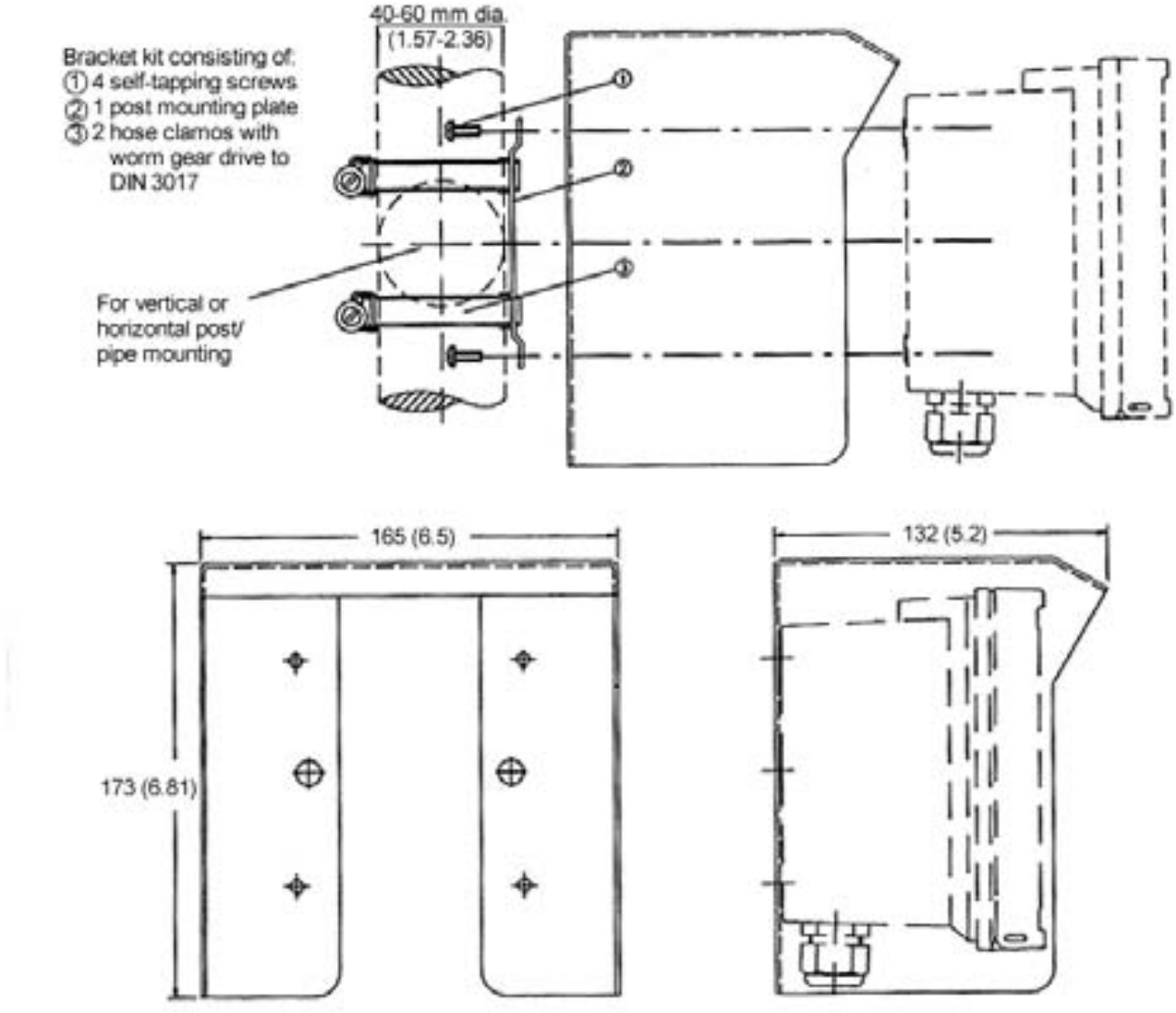


Figure 5 — Dimension Drawing for APT4000 with Wall or Pipe Mounting

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose**. Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

For More Information

Learn more about how Honeywell's APT4000 Series Toroidal Conductivity Transmitters can continuously measure conductivity, chemical concentration and salinity in industrial processes, visit our website www.honeywell.com/ps/hfs or contact your Honeywell account manager.

Honeywell Process Solutions
1860 West Rose Garden Lane
Phoenix, Arizona 85027
Tel: 1-800-423-9883 or 1-800-343-0228
www.honeywell.com/ps

70-82-03-42
March 2001

Honeywell

4-Wire Contacting Conductivity Analyzers Series APT4000 Specifications

70-82-03-45 October 2003

Overview

The Honeywell Analytical Process Analyzer (APT) 4000 Series2 continuously measures conductivity, resistivity and salinity in industrial processes within the power, chemical, pharmaceutical, pulp and paper, and water quality industries.

The APT4000's NEMA 4X/IP65-rated enclosure is specifically designed to meet the measurement needs of Class I, Division 2 (non-incendive) and general-purpose areas. The analyzer can be used with Honeywell conductivity cells or electrically compatible sensors. The analyzer has a universal (20-253 V ac/dc, 45-65 Hz) power supply with one 4-20 mA output, two high/low alarm relays, a diagnostic relay, and a wash relay.

Software (USP24) can be used on-line for monitoring the conductivity of purified water or water-for-injection in the pharmaceutical industry.

Description

The Honeywell APT4000 series of analyzers offer the widest available selection of advanced features in a reliable and economical instrument.

Reliability First

The advanced features of the APT4000 analyzer guarantee complete reliability. The APT4000 continuously monitors sensor and analyzer electronics and immediately displays diagnostic information at the onset of a problem. If an error or diagnostic is found, the analyzer will indicate the appropriate error code or pictograph (see Figure 2), blink a red LED and adjust the error current to 22 mA if desired. A manual loop-back check is available to test the integrity of the 4-20 mA output.

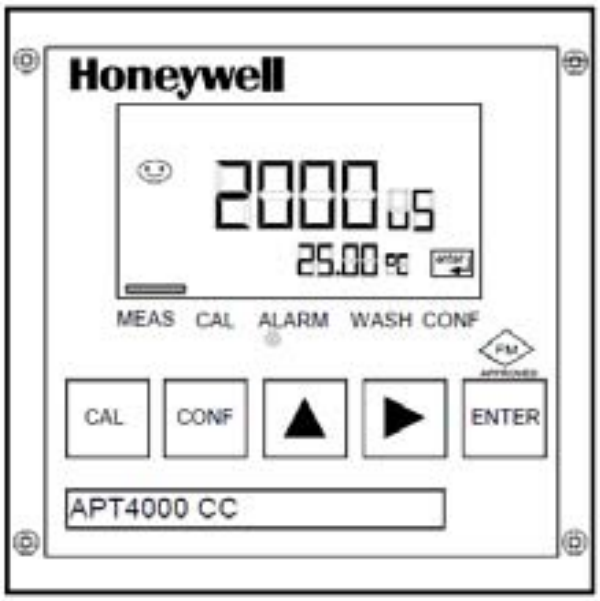


Figure 1—APT4000CC Analyzer

Quick Problem Assessment

The APT4000 has a large front display for quick recognition of process parameters and diagnostics even at a distance. Only the APT4000 employs *visual feedback* to quicken setup and maintenance times and to minimize errors made during calibrations. Visual feedback refers to pictograph type characters that appear on the display to both prompt and respond to operator and process changes.

Pictograph type characters also appear during problem conditions to report diagnostics for easy troubleshooting. There is even a Sensoface® pictograph that provides constant feedback to the operator on whether or not there is a problem with the cell. These easily learned and recognized symbols make the APT4000 an easy-to use instrument in any language.

Foolproof Calibrations

Each Honeywell conductivity cell comes supplied with one of four sensor factors (0.01, 0.1, 1.0, and 10). The lower cell constants are used for low conductivity water or resistivity measurements, while the higher ones are used for higher conductivity water or salinity measurements. Calibration of the cells is easy by either utilizing a factory-determined calibration factor or performing a simple one-point calibration.

Works with a Variety of Cells

Inputs to the APT4000 Series include all Honeywell conductivity cell types with appropriate temperature compensator and cell constant. These include the 4973 pure water cells, 4974 sanitary cells, 4905 general purpose cells, and the 4909 insertion/removal cells. In addition, a wide variety of other manufacturers' conductivity cells are compatible.

Fully Certified

Area certification for the ATP4000 is FM Class I, Div. 2, Groups A-D (nonincendive). Each analyzer comes standard with CE.

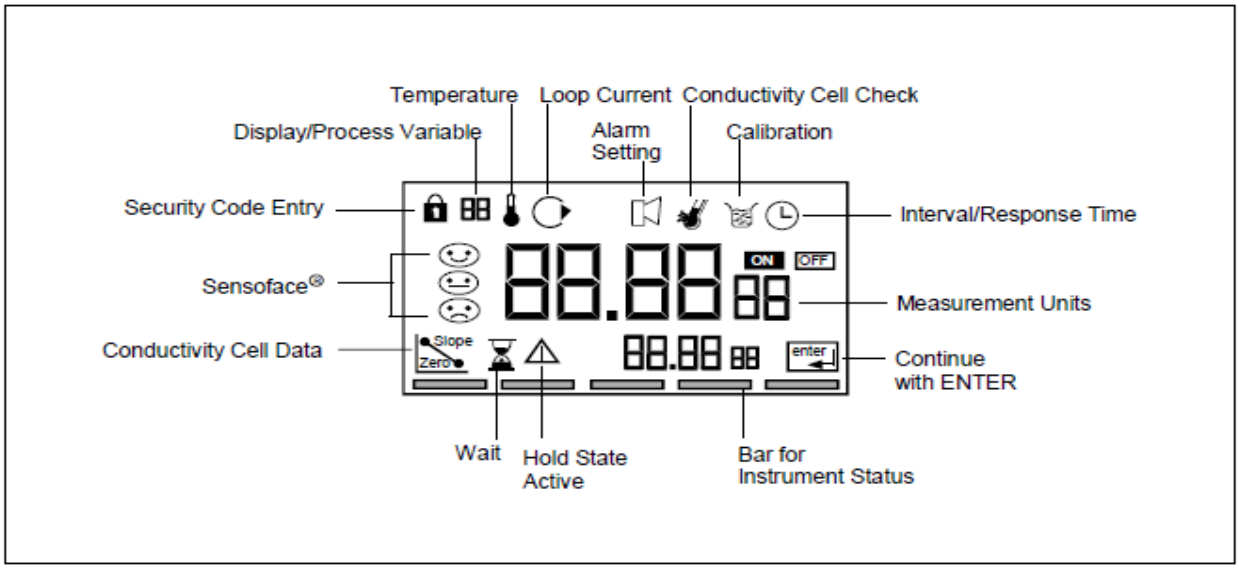


Figure 2—APT4000CC Series 2 Display Features

Features

- Large display with easy-to-read 0.75 inch measured value
- Simple operator interface with basic pictographs
- Application in Class I, Division 2 or General Purpose areas
- Continuous diagnostics for monitoring calibration, cell health, and analyzer self-test
- Manual loopback check for integrity of 4-20 mA output
- USP 24 Software with USP control limit capabilities.
- NEMA 4X, IP65 plastic enclosure
- Remote "hold last measured value capability.
- 2nd Parameter Set programmable for alternative applications.
- Wall, pipe or panel mounting
- Easy installation with preassembled empty enclosure and plug-in terminals
- Optical alarm with relay contact
- Quick Response Time (less than five seconds per step change)
- Dedicated high/low alarm relay
- 2 Current Outputs available with the 2nd one assigned to temperature.
- Sensocheck monitors condition of the Conductivity Cell
- PID (Pulse length and Pulse frequency) software installed.

Applications

The APT4000CC Analyzer is designed to meet the measurement needs of a number of industries, including:

- Pharmaceutical
- Water Quality
- Metals
- Power
- Chemical
- Pulp and Paper

Specifications

Conductivity Input (Refer to Figure 3)	
Display Range	(0.2 µS/cm * Cell Constant) to (1000 mS/cm * Cell Constant)
Accuracy	Less than 1% of Measured Value or ± (0.4 µS/cm * Cell Constant), whichever is greater
Step Change Response Time	Less than 5 seconds
Process Variable/Range	0.000 to 9.999 µS/cm, 00.00 to 99.99 µS/cm, 000.0 to 999.9 µS/cm, 0000 to 9999 µS/cm 0.000 to 9.999 mS/cm, 00.00 to 99.99 mS/cm, 000.0 to 999.9 mS/cm 0.000 to 9.999 MΩ-cm, 00.00 to 99.99 MΩ-cm, 000.0 to 999.9 MΩ-cm
Salinity	0.0 % to 45.0 % (0 °C to 35 °C)
Diagnostics	
Sensocheck	Polarization detection and monitoring of cable capacitance (can be switched off)
Sensor Standarization	- Entry of cell calibration factor with display of conductivity and temperature - Temperature probe adjustment
Sensoface	- Provides information on the electrode state via Sensocheck
USP24 Software	Software for on-line water conductivity monitoring in the pharmaceutical industry
Temperature Input	
Range	*8550 Ω Thermistor:* –10.0 °C to +130.0 °C (–14 °F to +266 °F) *Pt100/1000 Ω RTD:* –20.0 °C to +150.0 °C (+4 °F to +302 °F)
Resolution	0.1 °C or 1 °F
Accuracy	< 0.5 K
Temperature Compensation	Automatic Compensation using Pt 100 Ω or 1000 Ω RTD, 8550 ΩThermistor, or manual adjust
Display	LCD display 76 mm x 48 mm dimensions (3” x 1 7/8”), 7-segment *Cond Value:* character height 17 mm (.66") , meas. symbol 10 mm (.4") *Temperature:* character height 10 mm (.4"), meas. symbol 7 mm (.33") Sensoface with three states, 5 status bars, 16 pictographs / symbols, Red Alarm LED Security protection with four-digit mode codes to access calibration and configuration options

Supply/Output	
Output Current	0 mA or 4 mA to 20 mA current loop, 10 V floating Output #1 for Process Variable, Output #2 for Temperature
Supply Voltage	20 V to 253 V ac/dc, 45 Hz to 65 Hz, 2 VA / 1.5 W
Overrange	22 mA for error messages
Current Error	< 0.3 % of current value +0.05 mA
Current Source	3.80 mA to 22.0 mA
Output Characteristic	Linear or Logarithmic
Minimum Span	*LIN:* 5% of the selected range. *LOG*: 1 decade
PID Function	Relay assignable for PID Control Pulse Length / Pulse Frequency.

Alarms/Relays	
Contacts	*Alarm minimum contact:* SPST N/O (Hysteresis 0.2% of measured range) *Alarm maximum contact:* SPST N/O (Hysteresis 0.2% of measured range) *Diagnostic contact:* SPST N/C *Wash contact:* SPST N/O
Maximal Current/Voltage	*AC*: < 250 V / < 3A / < 750 VA *DC:* < 30 V/ < 3A / < 90 W
Physical	
Enclosure	Plastic enclosure made of PBT (polybutylene terephthalate) bluish-gray RAL 7031
Mounting	Wall, Pipe, or Panel Mount
Dimensions	*Height:* 144 mm (5.67") *Width*: 144 mm (5.67") *Depth:* 105 mm (4.13")
Protection	NEMA 4X, IP65
Cable glands	3 breakthroughs for PG 13.5 2 breakthroughs for NPT 1/2” or Rigid metallic conduit
Weight	Approximately 1 kg (2.2 lb.)

Area Certifications / Compliances	
Area Certification	Zone 2 (USA) FM: NI, Class I, Division 2, Groups A-D, T4
Data Retention	Parameters and calibration data > 10 years (EEPROM)
RFI Suppression / Immunity to ESD	To EN 50 081-1 and EN 50 081-2
Ambient Conditions	*Operation/Environmental temperature:* (T4) –20 °C to +55 °C (–4 °F to +131 °F) (T6) –20 °C to +40 °C (–4 °F to +104 °F) *Transport and Storage temperature:* –20 °C to +70 °C (–4 °F to +158 °F)

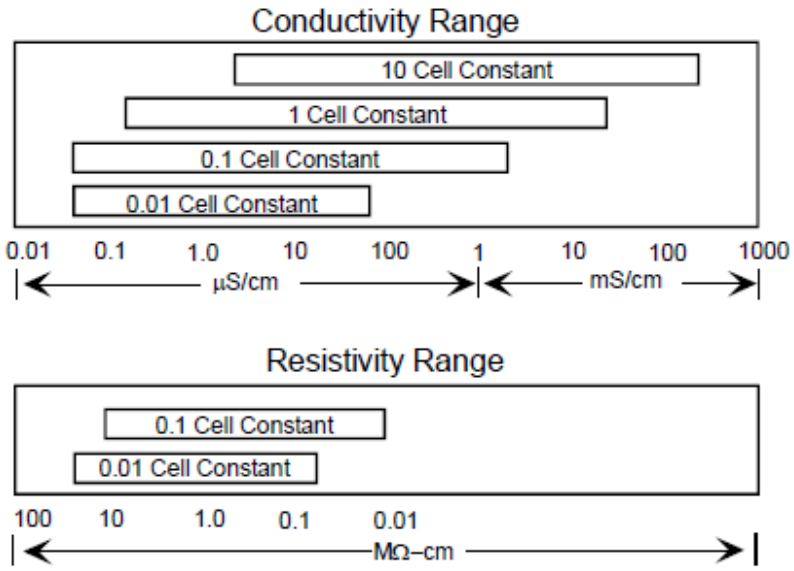


Figure 3—Optimal Cell Constant for Conductivity or Resistivity Ranges

Model Selection Guide

Reference 51-52-16-73

Instructions

- APT4000 Analyzer Offers:
  - Power Requirements - Universal, 20 to 253V AC/DC 45 to 65 Hz
  - Standard - NEMA 4X, IP65
  - Standard Approvals:
    - General Purpose; also FM Class I, Div 2, Groups A-D
  - Standard - All models CE Compliant
  - High/Low Alarm Relays
  - Three mounting types: **(must be ordered separately)**
    - Panel Mount Kit
    - Pipe/Wall Mount Kit
    - Protective Hood (requires Pipe/Wall Mount Kit)
- Select the desired key number. The arrow to the right marks the selection available.
- Make one selection from Tables using the column below the proper arrow.
  A dot (•) denotes unrestricted availability.

Key Number _ _ _ _ _ _ _ _ _ - I _ _ _

KEY NUMBER Description of Measurement Type	Selection	Availability ↓	↓	↓
pH/ORP	APT 4000 PH			
Toroidal (Electrodeless) Conductivity	APT 4000 TC			
Contacting Conductivity	APT 4000 CC			

TABLE I - Optional Equipment

User's Manual	English	E _ _	•	•	•
Future		_ 0 _	•	•	•
Future		_ _ 0	•	•	•

NOTE: Mounting kit not included with APT4000.

Accessory Parts	Part Number
Mounting Kits:	
Panel Mounting Kit	51205990-001
Pipe/Wall Mounting Kit	51205988-001
Protective Hood (requires pipe/wall kit)	51205989-001
Instruction Manual - pH	70-82-25-103
Instruction Manual - Toroidal (Electrodeless) Conductivity	70-82-25-104
Instruction Manual - Contacting Conductivity	70-82-25-105

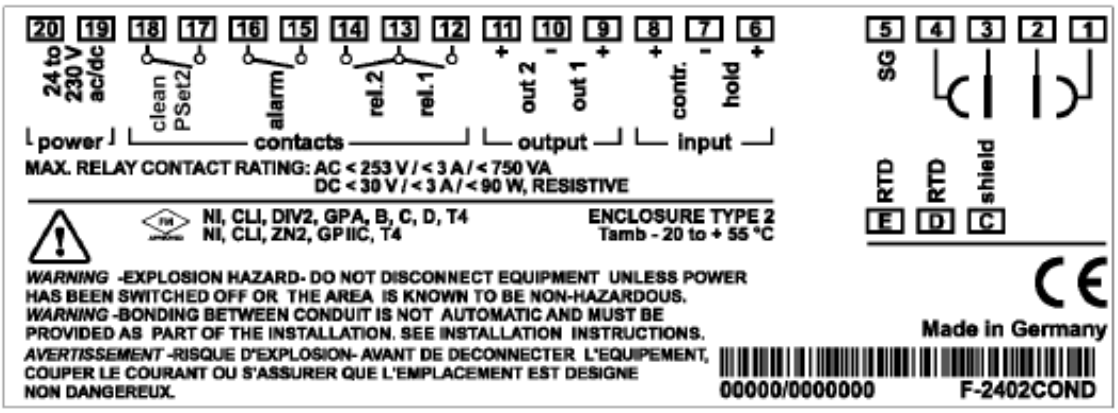


Figure 4—APT4000CC Terminal Assignments

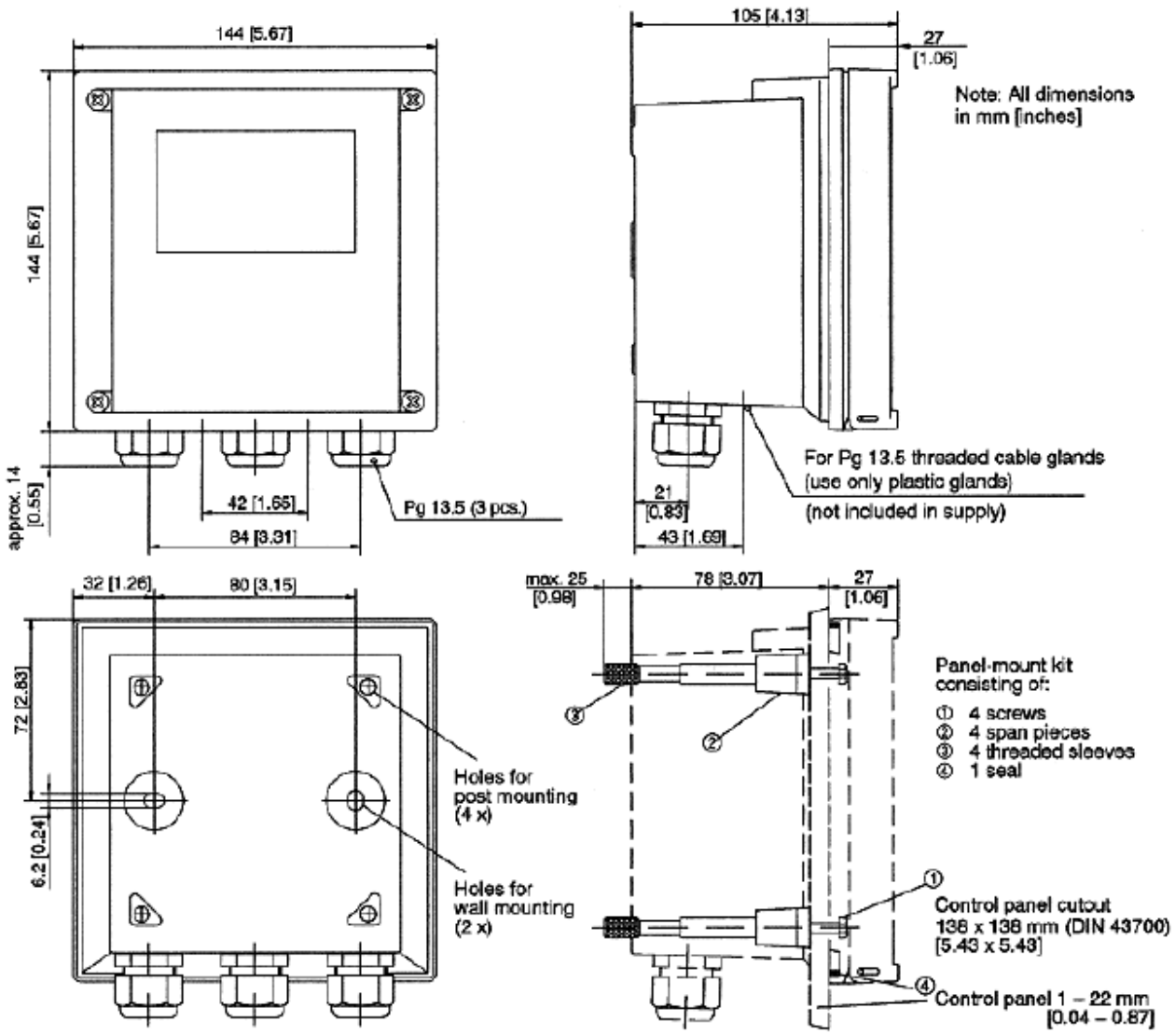


Figure 5—Dimension Drawing for APT4000 and P/N 51205990-001 Panel Mounting Kit

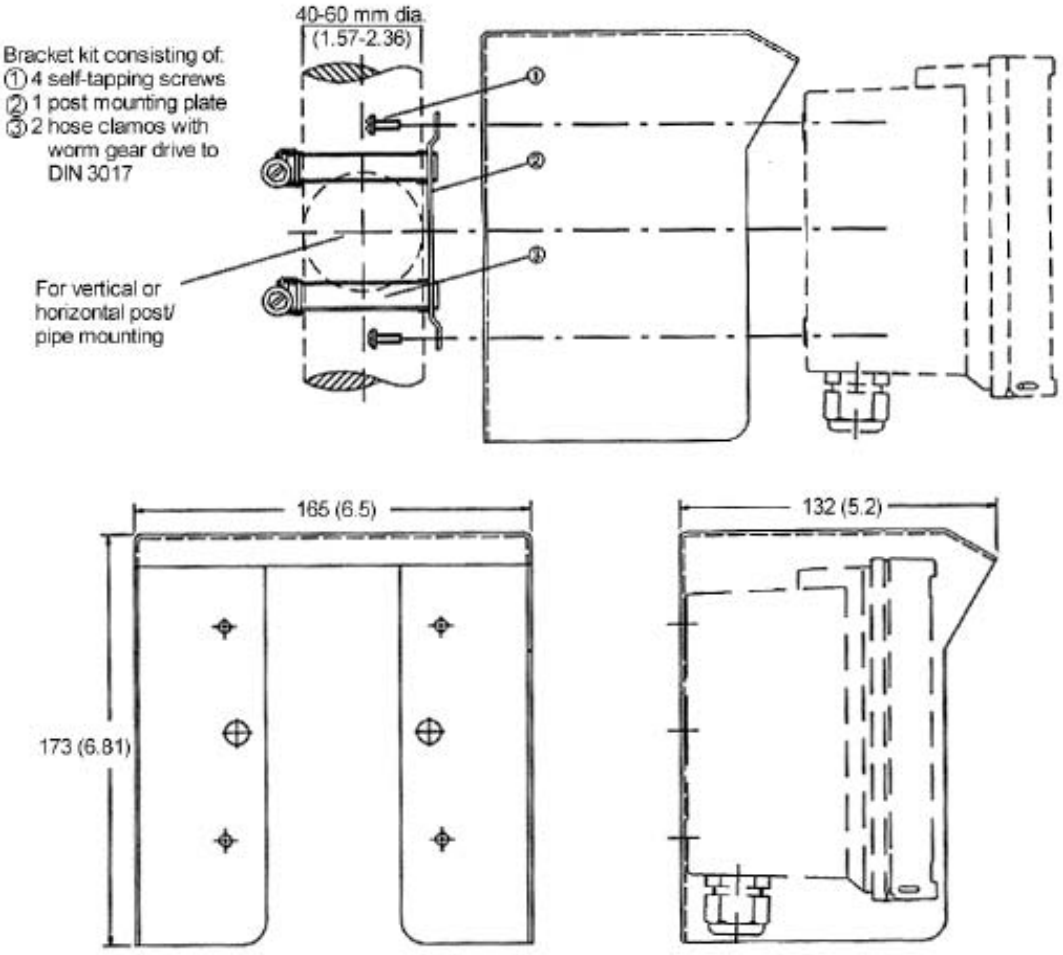


Figure 6—Dimension Drawing for APT4000 with Wall or Pipe Mounting

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.** Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Sensoface® is a registered trademark of Knick GmbH & Co. KG, Germany

For More Information

Learn more about how Honeywell's 4-Wire Contacting Conductivity Analyzers can be used to measure conductivity, resistivity and salinity in industrial processes, visit our website www.honeywell.com/ps/hfs or contact your Honeywell account manager.

Honeywell Process Solutions
1860 West Rose Garden Lane
Phoenix, Arizona 85027
Tel: 1-800-423-9883 or 1-800-343-0228
www.honeywell.com/ps

70-82-03-45
October 2003

Technical Information

Honeywell

UDA2182 Universal Dual Analyzer Specifications

70-82-03-54 January 2009

Overview

The UDA2182 Universal Dual Analyzer is a new, economical, dual input analyzer addition to Honeywell's Smart Sensor product family.

The analyzer can accept single or dual inputs from Honeywell pH, ORP, contacting conductivity and dissolved oxygen sensors. For dual units the inputs can be ordered in any combination.

The UDA2182 monitors and controls Analytical process variables in applications such as:

- Power water quality control
- Wastewater influent & effluent
- Pure water preparation
- Food and Dairy
- Neutralization

Features

- Single or Dual input measurement
- Dual input in any combination of pH, ORP, contacting conductivity, or dissolved oxygen
- Versatile, backlit graphical display
- Infrared PC & Pocket PC configuration
- Optional input from Honeywell remote digital preamplifiers and Durafet Cap Adapters
- Isolated inputs and outputs
- CSA Type 4X (NEMA 4) enclosure
- Multilanguage prompts
- Two analog outputs standard plus one additional optional
- Two electromechanical relays standard plus two additional optional
- Real Time clock for Auto and History functions

Figure 1 - Front of UDA2182 Analyzer

- Auto Clean/Auto Cal functions
- Event History screens
- Calibration History information
- Easy access through hinged front door
- Full DIN Size
- Panel, wall or pipe mounting is available
- Easily Field Up-gradable
- Ethernet and RS485 Communications

The UDA2182 is a functional replacement for older Models 7082 and 9782 Analyzers. It will fit into the same panel cutout and has many of the same features and benefits of the former analyzers. Therefore it is compatible with existing pH and conductivity applications and installations.

The UDA2182 is UL Listed and CSA Certified. It is also CE Compliant.

The unique UDA2182 display is a graphical backlit LED. Two PV values along with their Unit of Measure can be displayed simultaneously. The process temperature of both PVs is also displayed. The versatile display will also display the analog output FS percent and the state of the relays.

Features (continued)

Tagging and time or date information as well as status messages are available on the display and are easily configured by the user.

Configuration can be done with a PC through communication or with a Pocket PC, using the embedded infrared communication port. No need to get access to the back of the controller to download or upload a brand new configuration!

Analytical Inputs

The UDA2182 is a “Mix & Match” design. Analytical measurements of pH, conductivity and dissolved oxygen (ppm or ppb) can all be done in one analyzer. The unit can be used as a single input or dual input instrument – the user decides what measurements are included.

The input boards are easily replaced and the addition of additional relays or an analog output is done with a single board. The “Mix –n– Match” design reduces inventory and increases flexibility. A user can purchase a basic unit and then add input and output boards as needed. The board changes are fast and easy with front, hinged access to the analyzer.

The wiring is easily accessible through the front and the boards can be pulled out to facilitate the wiring of sensor inputs. Inputs are isolated so grounding problems associated with sensor input signals are minimized.

Outputs and Control

The following output types are available:

- Current Outputs (4-20 or 0-20 ma)
- Electromechanical Relays (5 amps)

The outputs are isolated and can be field allocated to the input PV, temperature, or computed value (conductivity).

Control Algorithms – Depending on the output algorithms specified, the controller can be configured for the following control algorithms:

- On-Off
- Current Adjusting Type (CAT)
- Pulse Frequency Type (PFT)
- Duration Adjusting Type (DAT)
- PID

Each control loop has as standard an auto-tuning feature using Honeywell’s performance proven Accutune III tuning algorithm. A selectable “Fuzzy Logic” algorithm is also provided for each loop to suppress unwanted process setpoint overshoot.

Alarms

Two (or four) electromechanical alarm relays are field selectable for activating external equipment when preset alarm setpoints are reached based on the PV. Each alarm setpoint can be either a high or low alarm. The relays can also be assigned to temperature or diagnostics. The alarm hysteresis is configurable from 0 to 100% of range.

Operator Interface

Display – The UDA2182 has a versatile backlit, graphical LED display that is easy to read, even in the most difficult installations.

Multi-language prompts guide the operator step-by-step through the configuration process assuring quick and accurate entry of all configurable parameters. Nine languages are available via configuration: English, French, German, Spanish, Italian, Russian, Turkish, Polish and Czech.

Real Time Clock —A versatile clock set-up can be displayed on the tag name stripe and is used to initiate Auto Clean/Auto Cal functions and date/time stamp history logs.

Dedicated Keys —Provide direct access to Setup and Calibration to simplify and speed operation. Display key gives you access to advance function screens such as Control, Auto Cycling, USP26 and Calculated pH.

Miscellaneous

Moisture Protection – CSA Type 4X (NEMA 4X) rating for front and case permits use in applications where it may be subjected to moisture, dust, or hose-down conditions.

CE Mark – Conformity with 73/23/EEC, Low Voltage Directive and 89/336/EEC, the EMC Directive as a standard feature.

Approval Body Options – General Purpose CSA certification and UL listing and FM/CSA Class I, Div. 2 is standard.

Data Security – Keyboard security protects configuration and calibration data, accessed by a configurable 4-digit code. Nonvolatile EEPROM memory assures data integrity during loss of power.

Calculated pH – High purity water pH can be calculated from Specific and Cation conductivities to be used as a check on in-line high purity water pH measurements.

Diagnostic/Failsafe Outputs – Continuous diagnostic routines detect failure modes, trigger a failsafe output value and identify the failure to minimize troubleshooting time.

High Noise Immunity –The controller is designed to provide reliable, error-free performance in industrial environments that often affect highly noise-sensitive digital equipment.

Quality/Support – The UDA2182 is covered by an 18-month warranty and backed up by a toll-free phone number for technical assistance (US Only).

Auto Buffer Calibration – for pH measurement the unit can be set up to recognize NIST, US, and Euro buffers and automatically select the standardize and slope values at the calibration temperature.

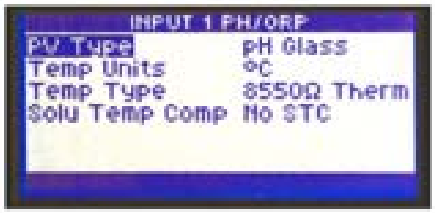
Solution Temperature Compensation – For high purity water measurement the user can select pre-set compensations or configure custom values.

USP26 Alarm Capabilities – Relays can be configured to alarm on conductivity values as determined by the USP26 Standards.

Computed Variables – For two-cell conductivity measurements, computed values of %Rejection/Passage, Difference, or Ratio can be displayed and assigned to the outputs or alarms. CO2 concentration in ppm can be calculated from de-gassed conductivity measurement.

Dissolved Oxygen –Auto-ranging of display and outputs with relays to indicate range, specialized probe bias diagnostics.

Auto Clean/Auto Cal –Built-in real time clock is used to set-up versatile cycles that can be used to initiate automatic sensor cleaning and then calibration.



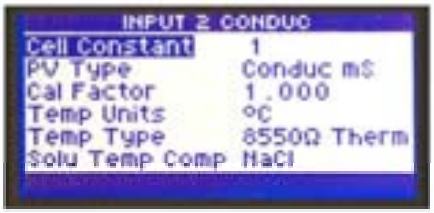
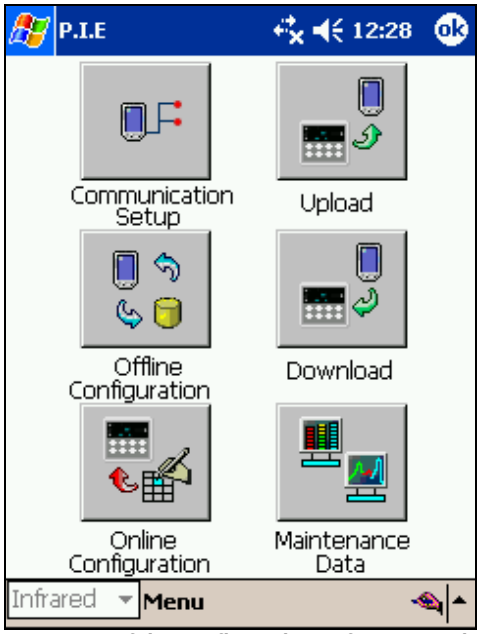


Figure 2 – UDA2182 Displays

PC & Pocket PC Software

Features

- Create configurations with intuitive software program running on a Pocket PC, a Desktop or a laptop computer.
- Create/edit configurations live; just connect software to analyzer via IR, RS485, or Ethernet
- Create/edit configurations offline and download to analyzer later via comm. port.
- Infrared port available on every UDA2182
- This software is available in English, Spanish, Italian, German, French, Russian, Turkish, Polish and Czech.



Screen capture of the configuration software running on a Pocket PC

Communications

Infrared

The infrared connection provides a non-intrusive wireless connection with the instrument and maintains NEMA4X integrity.

No need to get access to the back of the analyzer to communicate with the instrument, no need to take your screw driver to wire the communication cable, no wiring mistake possible! You can now duplicate an instrument's configuration, upload or download a new configuration in a matter of seconds, just by pointing your Pocket PC in the direction of the instrument.

Aim & Upload! It takes less than 2 seconds to upload a configuration from an instrument! You can then save the configuration file onto your PC or pocket PC for review, modification or archiving.

Furthermore, this software also gives you important maintenance information on the analyzer: instantly, get information on the current operating parameters, digital inputs and alarm status, identify internal or analog input problems.

Question: What if I have several analyzers on the same panel? How can I be sure I am communicating with the correct one?

Answer: The Infrared port is normally "off". You activate the infrared port on a particular analyzer by pressing any key. You can now communicate with the analyzer. If no communications are received for 2 minutes, the IR port will be shut down again.

Communications, Continued

Communications Card (Optional) The Communications card provides one Serial Port (RS485) and one Ethernet Port.

Serial port provides

- RS422/RS485 multi-drop
- 2400 to 115,200 programmable baud rate
- Modbus RTU protocol to read signals including PV, Temperature, Alarm Status, outputs, relay status, etc.
- Read/write four analog and four digital variables ***(Note 1)***

Ethernet port provides:

- Up to 5 Modbus simultaneous TCP connections
- Ethernet parameters are configured via the front-panel or web pages.
- Web server with up to 10 clients simultaneously
- Web pages ***(Note 2)*** setup the Ethernet port settings and monitor readings, alarms, statuses, events
- Multi-language Email to send alarm status changes. Alarm notification to eight email addresses. These must be configured using web pages signed in as the administrator.
- *DHCP*: (*Dynamic Host Configuration Protocol*) selectable via web page or front-panel
- Firmware upgrade to Main CPU board
- Firmware upgrade to Communications card

Note 1

There are four analog and four digital variables. These variables can be read and written remotely using Modbus function codes.

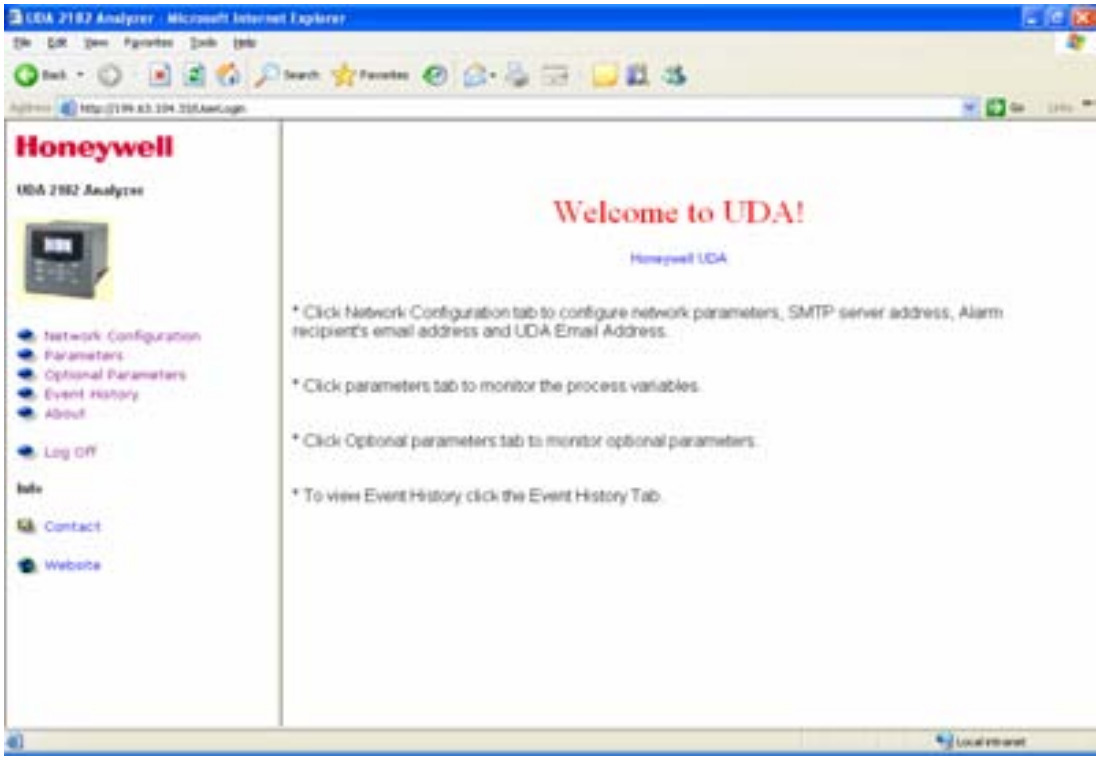
Variables will appear as a selection for various parameters:

- *Analog variables* can be an alarm source, analog relay source, current output source, monitor source, math source, auxiliary switch source, PID TRV, and PID remote setpoint.
- *Digital variables* can be an alarm disable, remote setpoint select, Tune Set2 select, digital relay source, logic-in source, auxiliary switch select, PID TRC select, PID RSP select, and auto cycle start source.

Note 2

Web pages provide the following:

- Multiple language support
- “Guest” accessibility for read-only permission
- “Admin” accessibility for read and write permission
- Readings of Inputs, Outputs, and Relay Outputs
- Status of Inputs, Outputs, and Alarms.
- Readings and Status of optional parameters (control, pharma, and auto-cycle)
- List of last twelve events
- Network configuration including IP address, subnet mask, gateway etc.
- Email configuration for alarm event notification



Screen capture of the UDA2182 Analyzer Web page

Specifications

UDA2182 Dual Input Analyzer	
Display	Graphical LCD with white LED Backlight Viewing Area: 66.8 mm (W) X 35.5 mm (H) Dot Pixels: 128 (W) X 64 (H)
Display Ranges	*pH:* 0-14 pH Temperature: -10 to 110°C (14 to 230°F) *ORP:* -1600 to +1600 mV *Conductivity:* 0.01 Cell: 0-2 uS/cm displayable to 200 uS/cm; 0-0.2 mS/cm; 0-2,000 ppb TDS; 0-200 ppm TDS 0.1 Cell: 0-20 uS/cm displayable to 2000 uS/cm; 0-2 mS/cm, 0-2,000 ppb TDS; 0-2,000 ppm TDS, 1.0 Cell: 0-200 uS/cm displayable to 20,000 uS/cm; 0-20 mS/cm; 0-200 ppm TDS; 0-20 ppt TDS 10 Cell: 0-2,000 uS/cm displayable to 99999 uS/cm; 0-200 mS/cm; 0-2,000 ppm TDS; 0-200 ppt TDS 25 Cell: 0-20,000 uS/cm displayable to 99999 uS/cm; 0-500 mS/cm; 0-10% Concentration displayable to 20% 50 Cell: 0-20,000 uS/cm displayable to 99999 uS/cm; 0-1,000 mS/cm; 0-20% Concentration Temperature: 0 to + 140°C (32 to 284°F) *Dissolved Oxygen:* 0 - 200 ppm 0 - 20 ppb 0 –200 ppb 0 – 2000ppb Temperature: 2 – 60°C (35.6 – 104°F), must not freeze

UDA2182 Dual Input Analyzer	
Keypad	10 Button Membrane Switch w/Directional Functionality UV/Solvent/Abrasion Resistant
Case Material	GE Valox® 357 (un-reinforced thermoplastic polyester)
Performances (Under reference operating conditions)	Accuracy: 0.5% of reading Output Accuracy: +/- 0.01 mA Drift: Negligible Repeatability: 0.05% Temperature Accuracy: pH and Conductivity Thermistor: +/- 0.1°C from –10 to 100° C, +/- 1.0° C from 101° to 140° C pH 1000 ohm RTD: +/- 0.4° C D.O. Thermistor: +/- 0.1° C from +2 to 60° C Reference Operating Conditions: 25 +/- 1° C; 10-40% RH; 120 or 240 Vac
Operating Conditions	Ambient Temperature Operating: 0 to 60°C (32 to 140°F) Storage: -30 to 70°C (-22 to 158°F) RH: 5 to 90% max. Non-condensing up to 40°C (104°F). For higher temperatures the RH specification is derated to maintain constant moisture content. Vibration: 5-15 Hz disp 8 mm pk to pk 15-200 Hz accel 2 G
Standard Analog Output	Two 0-20 or 4-20 mAdc, 750 ohms max., isolated from inputs, ground, and each other, independently field-assignable to any parameters and ranges. Proportional to user-set output range(s) of selected parameter(s).
Optional Analog Output	One 0-20 or 4-20 mAdc, 750 ohms max., isolated from inputs, ground, and each other. Independently field-assignable to any parameters and ranges.
Control Loop/Outputs (Optional)	Control Loops: 2 standard (one for each PV); current, pulse frequency, or time proportional Control Loop Types: PID, Duplex, On/Off Auto-tuning: Accutune II, fuzzy logic overshoot suppression, applicable to both control loops
Standard Alarm/ Control Relays	Two SPDT (Form “C”) Relays Resistive Load Rating: 4A, 120/240 Vac
Optional Additional Alarm/Control Relays	Two SPDT (Form “C”) Relays Resistive Load Rating: 4A, 120/240 Vac
Alarm/Control Settings	Alarm/on-off control delay: 0-100 seconds. Alarm/on-off control deadbands: individually set, from 1 count to full scale for pH, ORP, and temperature. On/off cycle period: 0 to 1000 seconds. On/off percent “on” time: 0 to 100%, 1% resolution. Setpoint and proportional band limit ranges: ±19.99 pH, ±1999 mV, -10 to 130°C, 1 count resolution. DAT cycle period: 1 to 1999 seconds. PFT maximum frequency: 1 to 200 pulses/minute. PFT pulse width: 50 ms, compatible with electronic pulse-type metering pumps.
Remote Preamplifier Input Option	Optional input card to accept input signal from Honeywell digital preamplifiers: Meridian II – 31075707 and 31022283 Durafet – 31079288 and Cap Adapter cables
pH Temperature Compensation	Conventional compensation for changing electrode output (Nernst response), plus selectable solution temperature compensation for high-purity water.
Calculated pH from Differential Conductivity	User selectable when unit has two Conductivity inputs. Used when ammonia or aminea is the water treatment chemical.

UDA2182 Dual Input Analyzer	
Auto Buffer Recognition (pH)	User Selectable Available Buffer Series: NIST, US, and Euro
Conductivity Compensations	NaCl, HCl, H2SO4, PO4, NaOH, NH3, Morpholine, Pure Water, Custom (User Selectable)
Dissolved Oxygen Measurement	Max flowrate (probe): 950 ml/min with flow chamber; no dependence on stirring or flowrate Atmospheric pressure: 500-800 mm Hg with internal sensor, for calibration Calibration with either Air or Sample
Auto Clean/ Auto Cal Function	Real time clock is used to set-up cycles to initiate a cleaning and calibration sequence. Cycle Set-up is user configurable.
Event History Screen	Event history screen stores 256 events with a description of the event and a Date/time stamp.
Calibration History Screen	Calibration history screen stores information on 128 calibration events with a date/time stamp.
Power Requirements	90 -264 Vac, 47-63 Hz, 15 VA . Memory retained by E^2PROM when power is off.
Wireless Interface	Type: Infrared (IR) Length of Link: 0 –1 M, 0 –15° Offset Baud Rate: 9600 Data Format: Modbus Protocol
RS422/RS485 Modbus RTU Slave Communications Interface (Optional)	*Baud Rate*: 2400, 4800, 9600, 19200, 38400, 57600, or 115200 selectable *Data Format:*: IEEE floating point and 32-bit integer. Word-Swap configurable. *Length of Link*: 2000 ft (600 m) max. with Belden 9271 Twinax Cable and 120 ohm termination resistors 4000 ft (1200 m) max. with Belden 8227 Twinax Cable and 100 ohm termination resistors *Link Characteristics:* Two-wire (half-duplex), multi-drop Modbus RTU protocol, 15 drops maximum or up to 31 drops for shorter link length. Modbus RTU slave: Provides monitoring of inputs outputs, statuses, alarms, and variables. Provides writing of variables for remotely modifying parameter settings
Ethernet TCP/IP Communications Interface (Optional)	*Type:* 10 or 100 BaseT; auto-speed and auto-polarity sensing *Length of Link*: 330 ft. (100 m) maximum. Use Shielded twisted-pair, Category 5 (STP CAT5) Ethernet cable. *Link Characteristics*: Four-wire plus shield, single drop, five hops maximum *IP Address*: IP Address is 192.168.1.254 as shipped from the factory *Recommended network configuration*: Use Switch rather than Hub in order to maximize UDA Ethernet performance *Configuration*: Ethernet parameters are configured via the front-panel or web pages. *Modbus TCP/IP*: Five simultaneous socket connections provide monitoring of inputs outputs, statuses, alarms, and variables. Provides writing of variables for remotely modifying parameter settings. *Modbus TCP/IP Data Format*: IEEE floating point and 32-bit integer. Word Swap configurable. *Web server*: multiple client support *Web pages*: monitoring inputs, outputs, statuses, alarms, and events *Multi-language Email*: Alarm notification to eight email addresses. These must be configured using web pages signed in as the administrator. *DHCP:* (Dynamic Host Configuration Protocol) selectable via web page or front-panel
Safety Compliance	UL/CSA General Purpose FM Approval for Class I, Div 2.
CE Compliance	CE Conformity (Europe): CE Mark on all models signifies compliance to EMC Directive

UDA2182 Dual Input Analyzer	
	84/336/EEC and LVD Directive 73/23/EEC. EMC Classification: Group 1, Class A, ISM Equipment Method of Assessment: Technical File; EN61326, EN61010-1 Declaration of Conformity: 51453667
Installation Rating	Installation Category (Overvoltage Category): Category II Pollution Degree 2 Altitude: 2000 m
Case Dimensions	156 mm X 156 mm X 150 mm (6.14” X 6.14” X 5.91”) Panel cutout: 138.5 mm X 138.5 mm (5.45” X 5.45”) Panel thickness: 1.52 mm (0.06”) min, 9.5 mm (0.38”) max
Enclosure rating	CSA Type 4X (NEMA 4X)
Weight	Approx 3 lbs (6.6kg)
Mounting	Panel mounting-hardware supplied. Optional Wall and 1” to 2” pipe mounting. Select option appropriate in Model Number.

Dimensions

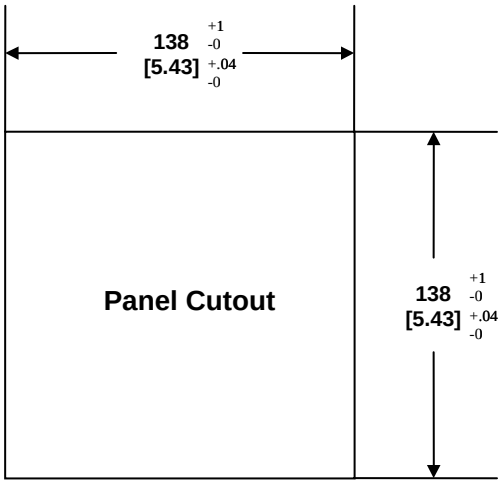
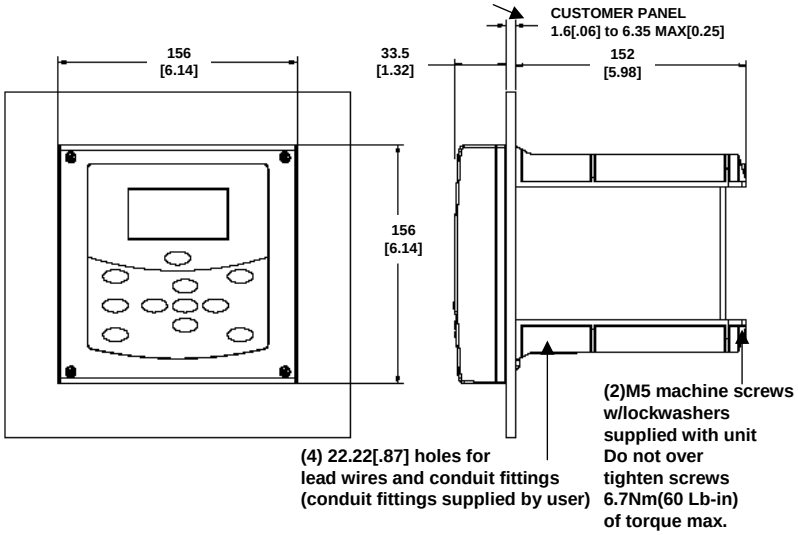


Figure 3 — Cutout and Panel Mount Dimensions



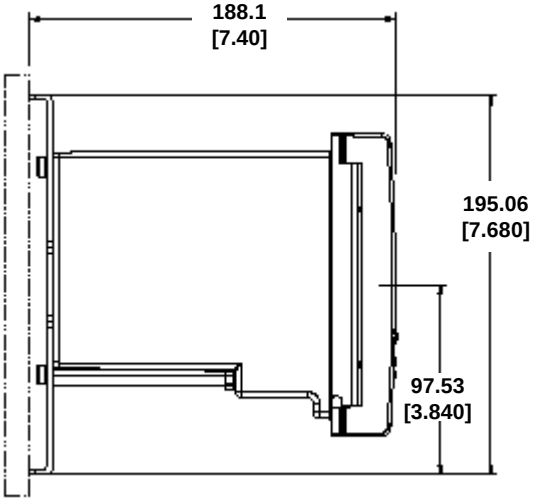


Figure 4 – Wall/Pipe Mounting Dimensions

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and **is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose**. Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

For More Information

Learn more about how Honeywell's UDA2182 Universal Dual Analyzer can offer more power, flexibility and performance, visit our website www.honeywell.com/ps/hfs or contact your Honeywell account manager.

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